

FRIDAY, OCT. 27, 1893.

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Contributions.

The Whistle Nuisance.

The South Carolina Railway,
CHARLESTON, S. C., Oct. 17, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I note an editorial in your issue of Oct. 13, regarding the annoyance inflicted upon citizens by the excessive whistling of locomotives. This is a subject which has been up on other occasions. The sounding of locomotive whistles within the limits of a city is very annoying, and the citizens are justified in asking for an abatement of such noises. Standard Code Rule No. 66 leaves the question with the trainmen to decide when it is necessary to blow the whistle, and on the strength of this rule the trainmen make their defense when brought up about or questioned as to why the whistle was blown.

I would recommend the following arrangement to be applied to locomotives which have to use whistle signals in city limits, viz.: an air pipe connected to the air reservoir on the engine, and either an ordinary steam whistle such as used for air signals, or a whistle made of gas pipe, such as used by trainmen on rear car. This would make sufficient sound so as to convey any signals which would be necessary within city limits. I make this suggestion because we have tried it and find that it works to very good advantage.

E. M. ROBERTS, S. M. P.

Reclining Chair Cars.

PITTSBURGH, PA., Oct. 12, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Do you not think that much might be done by the long lines east of Chicago toward making traveling a little more endurable to the average passenger? Why can not some enterprising management adopt something like those Wharton reclining chair cars, which are run west of Chicago? I have often noticed elderly passengers, weak women, and children striving to endure a night's ride in one of those instruments of torture, a day coach. If some general manager would try a journey from New York or Philadelphia to Chicago or St. Louis in an ordinary coach, and try to be comfortable, I believe he would agree with me that it was time something was done. A large proportion of the people who travel cannot afford to ride in the clowns of chair cars and sleepers run at present, and there are some who do not like a sleeping car. What is needed is a neat, convenient car, with reclining chairs, not of a very fine get-up, but so constructed that they could be tipped to suit the pleasure or needs of the passenger. These chairs being separate, it would be quite impossible for one passenger to occupy two seats, as is often done at present, particularly at night. And while doing this much for a long-suffering public, it would not be a bad idea to make some provisions so a passenger might wash his face once or twice in a 36-hour trip, without having to go back to the sleeper at the rear of the train. Some water, soap, and a few towels would not be very costly and would make travel a little more endurable.

J. J. CLAIR.

The Block System on Single Track Railroads.

Oct. 9, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your comments on the Colebourne collision (Sept. 29, page 722) you say that the preventive for such collisions is the block system. You allude to the need of more telegraph offices (by which you mean, I suppose, the employment of more telegraph operators so that all offices can be kept open at night), and I am constrained herefore to conclude that you are not wholly unmind-

ful of the gravity of the problem confronting any railroad management which shall start out to put into effect your remedy for head collisions; but have you not turned off with a mere word a question which is very difficult to deal with, and assumed as easy a task which every practical man finds to be a very hard one?

Of what good is a block system for trains running toward each other? Under the present system the engineer and the train dispatcher take the responsibility and we have to submit to their liability to make mistakes; is the telegraph operator anything but one more fallible guardian? The operator at station No. 2 is expected to telegraph to station No. 1 notifying him that it is safe for a train to run from 1 to 2; but before doing so he must not only see if the previous train from 1 has arrived, but also whether any train has started from 2 for 1; and, if one has started, to ascertain whether it has arrived at 1 he must depend upon the operator at 1. Is he not liable to two errors where the ordinary double-track operator is liable to only one?

With the present low earnings, with rates being reduced by competition and by legislative action—or what is fully as bad, legislative threats, which amount to coercion—most of us cannot afford the lap sidings and the semaphores and electric signals that some few prosperous roads have introduced. Even with these improvements they have to depend on the intelligence and loyalty of the operators and they consequently have a head collision occasionally. Without these specially arranged sidings the station operator cannot have suitable control over freight trains waiting at his station, and so cannot be depended upon to direct their movements promptly and efficiently. Nothing but the expensive signal-worked by the electric circuit through the rails will afford adequate protection for a single track road, and what company can afford that expense for its single track lines? And a single track road must have operators at the stations to deliver orders to the trains, even if it has the signals, so it is burdened with the expense of both the automatic system and the operator system. Railroads must devise some way to increase their earnings before they can adopt the elaborate safety appliances that the newspapers ask them to use; and these same newspapers clamor for lower rates at every opportunity.

GENERAL MANAGER.

Air Pump Performance.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Our attention has been drawn to a circular issued by the Westinghouse Air-Brake Co., called "A Comparative Test of the Westinghouse Air-Brake Company's Nine and One Half Inch Air Pump and the New York Air-Brake Company's No. 2 Duplex Air Pump." It is so at variance with actual results universally obtained with our duplex pump that we repeated the tests under the same conditions, measuring the air, with three reservoirs, in the same way. The results of the tests were as follows:

The duty required was to raise the pressure from atmospheric pressure to 55 lbs. per square inch in one cubic foot of space pumps working against a constant pressure of 90 lbs. per square inch in main reservoir; steam pressure 140 lbs. per square inch.

The pumps were the New York Air Brake Company's No. 3 duplex pump, two steam cylinders seven inches diameter, and two air cylinders, one 10 in. diameter and one 7 in. diameter, and

The Westinghouse Air-Brake Company's 9½-in. air pump, one steam and one air cylinder, each 9½ in. diameter.

Time per second.	Steam per cu. ft.	Piston travel	
	cu. ft.	ft. per sec.	
New York.....	7.174	1.881	174
Westinghouse.....	9.739	2.711	168.3

The test proves that the New York duplex pump delivers 34 per cent. more air per minute than the Westinghouse 9½-in. pump. It also shows that the New York duplex pump delivers 46 per cent. more air with the same amount of steam. This is in accordance with the results which should be expected from the principle of construction of the duplex pump. The capacity of the two air cylinders is 50 per cent. greater than the capacity of the two steam cylinders. Both air cylinders are filled with free air every stroke, and this is delivered to the reservoir. The efficiency must therefore be 50 per cent. greater than is possible with the Westinghouse pump, as that can only receive one measure of air for one measure of steam.

If any different results have been secured with the New York duplex pump it is because the pump was out of order.

The amount of heat developed in compressing air is in proportion to the rapidity of compression. A higher temperature might therefore be expected from a pump that compresses 34 per cent. more air in a given time. Our duplex pump was designed for a special purpose, namely, to furnish air for operating air brakes. In this service it is utterly impossible to generate sufficient heat to impair the efficiency of the pump.

THE NEW YORK AIR BRAKE CO.

[The tests referred to in this communication as having been published in a circular issued by the Westinghouse Air Brake Co. were summarized in an article which appeared in our issue of Sept. 15, to which the reader who is interested in this discussion is referred.—EDITOR RAILROAD GAZETTE.]

Locomotive Exhibits at the World's Fair.—II.

(For illustrations and tables see pages 778, 779, 780, 781.)

The illustrations and tables of dimensions of the locomotives exhibited by the Baldwin and the Schenectady locomotive works at the World's Fair were given in the *Railroad Gazette* of June 16, 1893; and with this issue the table is continued, giving the same data for the exhibits of the Rhode Island, the Cooke, the Rogers and the Brooks companies. In subsequent issues the table will be again continued for other exhibits.

The Superintendents of Bridges and Buildings.

The third annual meeting of the American International Association of Railway Superintendents of Bridges and Buildings was held in Philadelphia, Oct. 17 to 19, 1893. The convention was called to order at 10 a. m. Tuesday, Oct. 17, with the President, H. M. Hall (Ohio & Mississippi), in the chair. The rollcall showed about 40 members present. The applications of 17 new members were reported on favorably by the Nominating Committee and elected accordingly. After the reading of a number of communications and transacting of considerable routine business, the discussion of subjects brought up at last year's convention at Cincinnati, O., was taken up as unfinished business, the opportunity for discussion of the subjects reported on by committees at last year's convention having been too limited at the time.

The subjects of last year's meeting, brought up for discussion were: Painting Iron Bridges for Railroads; Framing and Protection of Howe Trusses and Other Wooden Bridges Against Fire and Decay; Construction and Maintenance of Framed and Pile Trestles; Cattle Guards, Interlocking Signals; Iron and Vitrified Pipe for Waterways; Water Supply on Railroads, and Advantages of Sharpening Piles Before Driving Them.

The discussions were quite lively and it was noticed that a very large proportion of the members took active part in the discussions, contrary, probably, to the usual experience at conventions. The remarks of the speakers were mostly confined to similar lines to those marked out by the different reports of the sundry committees on the several subjects presented at last year's convention.

The abandoning of ready mixed paints and all kinds of patent pigments seemed to find universal favor with the gentlemen present, and the committee's recommendation to use only lead and oil mixed by the railroad companies' men, generally indorsed.

In the discussion of pile trestles, the question of whether four piles per bent under a single track trestle was sufficient for the average height trestle seemed to receive the favorable endorsement of most of the speakers, as against the proposition of one member, that a single pile trestle should have six piles per bent.

The questions of guard rails, bridge and trestle ties, and rerailing devices at the ends of bridges all came in for considerable general talk without producing any final conclusions as the general sense of the meeting on the subjects.

In talking of cattle guards, only one member spoke in favor of pits, while the general opinion was decidedly against pit guards and in favor of surface guards. Some members spoke favorably of certain kinds of metal surface guards as having given good satisfaction, but the general tendency seemed to be to deprecate the different forms of iron surface cattle guards in use, on account of their alleged unreliability to absolutely turn stock, and especially on account of the claim made that in case any loose parts hanging down below the cars or engine got caught in the metal strips there was considerable damage caused and the cattle guard generally irretrievably damaged. Several speakers favored decidedly the form of surface cattle guards with wooden slats, beveled on top, and rounded at ends and painted white, as giving a cheaper and more effective home-made article than the patent surface guards in the market.

The subject of interlocking signals was considered to be so important as to hardly be possible to do it justice in the short time available for discussion, and therefore its consideration was referred to a committee for a special report to be presented at next year's convention.

Water Supply on Railroads brought out a lively discussion on details generally.

The afternoon session was taken up by the discussions just mentioned. In the evening the members attended the theatre by invitation. The morning session on Wednesday, Oct. 18, was taken up by the presentation and reading of the reports of the various committees on special subjects appointed at last year's convention. The reports read, with the names of the committee members, were as follows:

Discipline, and Benefits Derived, and Who Are the Beneficiaries: George W. Andrews, W. R. Damon, T. M. Strain and G. W. Turner.

Turntable Best, with a View to Economy and Durability and Strength: G. W. Markley, H. F. Martin, James H. Travis and Charles Walker.

Water Columns, Best, Cheapest, Simplest and Most Durable: C. E. Fuller, A. S. Markley, H. V. Spalding and E. L. Carey.

Cooling Stations, Including Storage Bins and for Cooling Engines: J. E. Wallace, G. W. Gooch, G. H. Hinman and J. H. Cummings.

Crossing of Rails and Its Effect on Structure: George M. Reid, L. K. Stanford, J. B. Mitchell and L. S. Ide.

Guard Rails on Bridges, Advantages and Disadvantages, and Best To Be Adopted: O. J. Travis, Q. McNab, J. F. Mock and J. M. Staden.

Platforms, Height and Distance from Rail, and Mode of

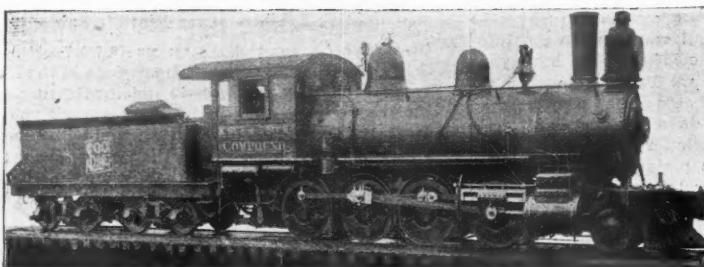


Fig. 1—R. I. Compound.

Cylinders	21 and 31 × 24 in.	Height of stack	14 ft. 2½ in.
Weight on drivers	118,220 lbs.	Heating surface, firebox	160 sq. ft.
Weight on truck wheels	11,250 lbs.	Heating surface, tubes	1,540 sq. ft.
Weight, total	129,470 lbs.	Heating surface, total	1,700 sq. ft.
Wheel base, engine	22 ft. 6 in.	Grate surface	25 sq. ft.
Wheel base, driving	15 ft. 0 in.	Driving wheels, diam.	50 in.
Boiler, diam.	62 in.	Engine truck wheels, diam.	30 in.
		Tender truck wheels, diam.	33 in.

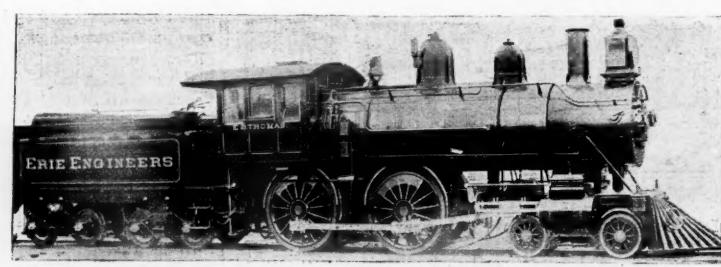


Fig. 5—Cooke.

Cylinders	19 × 26 in.	Height of stack	14 ft. 10 in.
Weight on drivers	88,750 lbs.	Heating surface, firebox	187 sq. ft.
Weight on truck wheels	15,850 lbs.	Heating surface, tubes	1,707 sq. ft.
Weight, total	134,600 lbs.	Heating surface, total	1,894 sq. ft.
Wheel base, engine	23 ft. 8¾ in.	Grate surface	36.3 sq. ft.
Wheel base, driving	8 ft. 6 in.	Driving wheels, diam.	72 in.
Boiler diameter	66 in.	Engine truck wheels, diam.	33 in.
		Tender truck wheels, diam.	36 in.

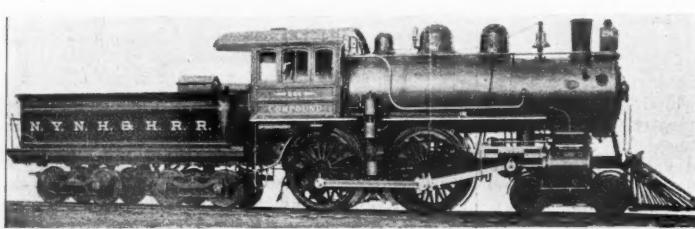


Fig. 2—R. I. Compound.

Cylinders	21 and 31 × 26 in.	Height of stack	13 ft. 10¾ in.
Weight on drivers	84,000 lbs.	Heating surface, firebox	165.5 sq. ft.
Weight on truck wheels	41,000 lbs.	Heating surface, tubes	1,229.0 sq. ft.
Weight, total	125,000 lbs.	Heating surface, total	1,395.5 sq. ft.
Wheel base, engine	22 ft. 9 in.	Grate surface	34.5 sq. ft.
Wheel base, driving	8 ft. 6 in.	Driving wheels, diam.	78 in.
Boiler, diam.	60 ft.	Engine truck wheels, diam.	33 in.
		Tender truck wheels, diam.	36 in.

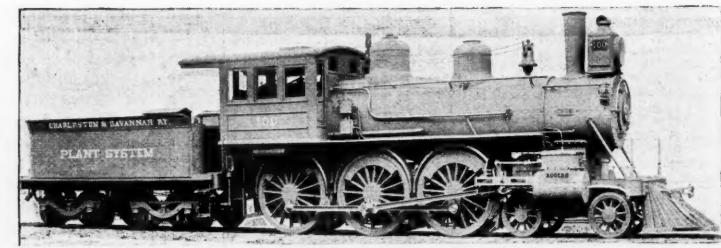


Fig. 6—Rogers.

Cylinders	19 × 24 in.	Height of stack	15 ft.
Weight on drivers	88,500 lbs.	Heating surface, firebox	153 sq. ft.
Weight on truck wheels	34,500 lbs.	Heating surface, tubes	1,815 sq. ft.
Weight, total	133,000 lbs.	Heating surface, total	1,968 sq. ft.
Wheel base, engine	21 ft. 8 in.	Grate surface	31.38 sq. ft.
Wheel base, driving	13 ft. 6 in.	Driving wheels, diam.	79 in.
Boiler, diam.	58 in.	Engine truck wheels, diam.	36 in.
		Tender truck wheels, diam.	36 in.

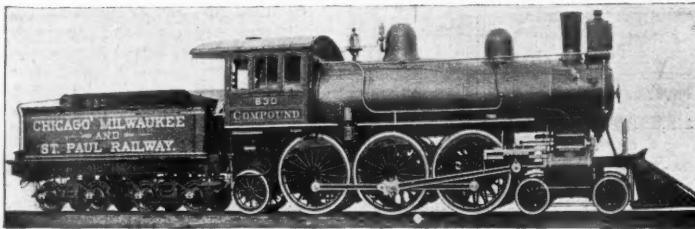


Fig. 3—Rhode Island.

Cylinders	21 and 31 × 26 in.	Height of stack	15 ft. 11 in.
Weight on drivers	90,000 lbs.	Heating surface, firebox	204 sq. ft.
Weight on truck wheels	{ F. 41,000 lbs. B. 19,000 lbs.	Heating surface, tubes	1,584 sq. ft.
Weight, total	150,000 lbs.	Heating surface, total	1,788 sq. ft.
Wheel base, engine	29 ft. 9¾ in.	Grate surface	27 sq. ft.
Wheel base, driving	13 ft. 6 in.	Driving wheels, diam.	78 in.
Boiler, diam.	62 in.	Engine truck wheels, diam.	{ B. 42 in. F. 33 in.
		Tender truck wheels, diam.	33 in.

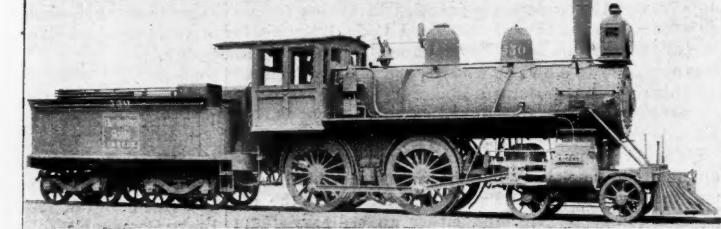


Fig. 7—Rogers.

Cylinders	18 × 24 in.	Height of stack	15 ft. 6 in.
Weight on drivers	65,500 lbs.	Heating surface, firebox	110 sq. ft.
Weight on truck wheels	36,500 lbs.	Heating surface, tubes	1,368 sq. ft.
Weight, total	102,000 lbs.	Heating surface, total	1,418 sq. ft.
Wheel base, engine	22 ft. 11½ in.	Grate surface	24.5 sq. ft.
Wheel base, driving	8 ft. 6 in.	Driving wheels, diam.	.69 in.
Boiler, diam.	.56 in.	Engine truck wheels, diam.	37 in.
		Tender truck wheels, diam.	37 in.

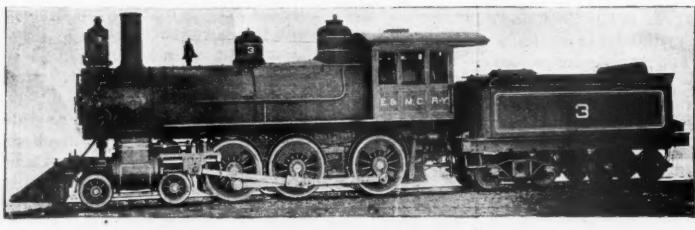


Fig. 4—Cooke.

Cylinders	21 × 26 in.	Height of stack	14 ft. 11 in.
Weight on drivers	102,000 lbs.	Heating surface, firebox	179.75 sq. ft.
Weight on truck wheels	35,000 lbs.	Heating surface, tubes	1,791.03 sq. ft.
Weight, total	137,000 lbs.	Heating surface, total	1,970.78 sq. ft.
Wheel base, engine	23 ft. 8 in.	Grate surface	28 sq. ft.
Wheel base, driving	12 ft. 11 in.	Driving wheels, diam.	62 in.
Boiler, diam.	64 in.	Engine truck wheels, diam.	30 in.
		Tender truck wheels, diam.	33 in.

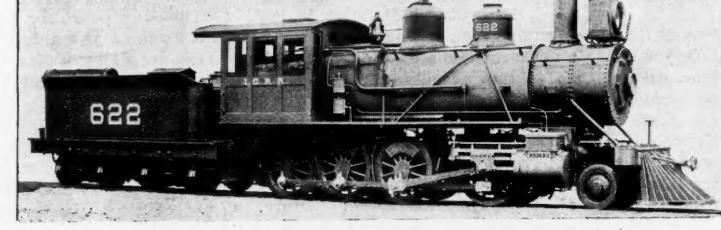


Fig. 8—Rogers.

Cylinders	21 × 24 in.	Height of stack	15 ft. 2 in.
Weight on drivers	118,600 lbs.	Heating surface, firebox	168 sq. ft.
Weight on truck wheels	18,700 lbs.	Heating surface, tubes	1,451.5 sq. ft.
Weight, total	137,300 lbs.	Heating surface, total	1,622.5 sq. ft.
Wheel base, engine	24 ft. 5 in.	Grate surface	28.19 sq. ft.
Wheel base, driving	16 ft. 9 in.	Driving wheels, diam.	.56 in.
Boiler, diam.	.62 in.	Engine truck wheels, diam.	33 in.
		Tender truck wheels, diam.	36 in.

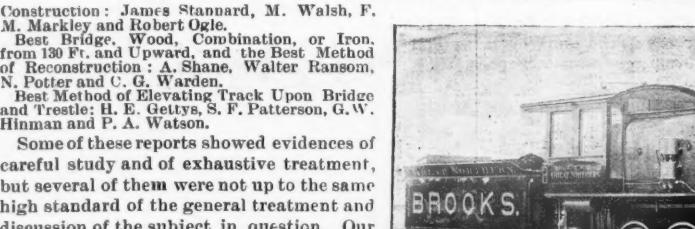


Fig. 9.

Cylinders	20 × 26 in.	Wheel base, total	25 ft. 3 in.
Driving wheels, diam.	.55 in.	Wheel base, engine and tender	.52 ft.
Weight on drivers	136,000 lbs.	Boiler, diam	68 in.
Weight on truck	20,000 lbs.	Heating surface, firebox	192 sq. ft.
Weight, total	156,000 lbs.	Heating surface, tubes	2,035 sq. ft.
Wheel base, driving	15 ft. 6 in.	Heating surface, total	2,237 sq. ft.
		Grate surface	25.3 sq. ft.

Construction: James Stannard, M. Walsh, F. M. Markley and Robert Ogle. Best Bridge, Wood, Combination, or Iron, from 130 Ft. and Upward, and the Best Method of Reconstruction: A. Shane, Walter Ransom, N. Potter and C. G. Warden. Best Method of Elevating Track Upon Bridge and Trestle: H. E. Gettys, S. F. Patterson, G. W. Hinman and P. A. Watson. Some of these reports showed evidences of careful study and of exhaustive treatment, but several of them were not up to the same high standard of the general treatment and discussion of the subject in question. Our space will not allow us to review these reports at present in detail, but we shall take them up later. The afternoon of Wednesday was devoted to sight-seeing.

At the morning and afternoon sessions on Thursday, Oct. 19, considerable routine business was transacted. At the election of officers Mr. J. E. Wallace (Wabash), of Springfield, Ill., was elected President for the ensuing year, Mr. Hall having declined renomination. Mr. F. S. Patterson (Concord & Montreal), of Concord, N. H., was re-elected Secretary. Mr. G. W. Andrews (Baltimore & Ohio), Mr. W. A. McGonagle (Du-

Isth & Iron Range) and Mr. L. K. Spaford (Kansas City, Fort Scott & Memphis), were elected Vice-Presidents, and G. M. Reid, (Lake Shore & Michigan Southern), Treasurer. Mr. Andrews, whose untiring efforts and work as chairman of the local committee for the reception of members at the Convention had resulted in giving the members such an enjoyable and interesting sojourn, was thanked on behalf of the Association, and presented with a handsome silver tea service on behalf of the members present. The prize offered by the *Railway Age* for the best paper on the subject of "The Duties and Qualifications of a Railroad Superintendent of Bridges and Buildings," was awarded to Mr. H. E. Gettys (Norfolk & Western), seven papers having been contributed.

As the time at the command of the Society was limited, it was decided to postpone until next year's meeting the regular discussion of the subjects, reported on by committees at the present meeting, as mentioned above. The brief discussion

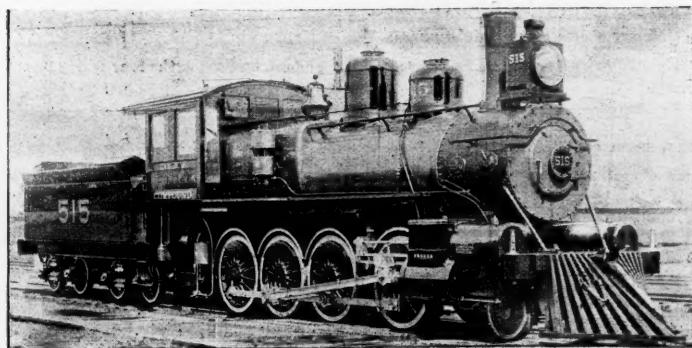


Fig. 10—Brooks Compound.

Cylinders.....	13 and 22 x 24 in.	Wheel base, engine and tender.....	50 ft.
Driving wheels, diam.....	.51 in.	Boiler, diam.....	.63 in.
Weight on drivers.....	130,000 lbs.	Heating surface, firebox.....	177 sq. ft.
Weight on truck.....	17,003 lbs.	Heating surface, tubes.....	1,419 sq. ft.
Weight, total.....	147,000 lbs.	Heating surface, total.....	1,596 sq. ft.
Wheel base, driving.....	15 ft. 6 in.	Grate surface.....	23.3 sq. ft.
Wheel base, engine.....	23 ft.		

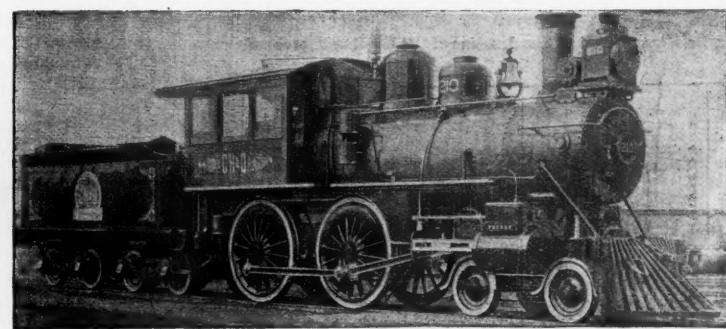


Fig. 14—Brooks.

Cylinders.....	18 x 26 in.	Wheel base, engine and tender.....	46 ft. 8 in.
Driving wheels, diam.....	.73 in.	Boiler, diam.....	.58 in.
Weight on drivers.....	74,000 lbs.	Heating surface, firebox.....	133 sq. ft.
Weight on truck.....	38,000 lbs.	Heating surface, tubes.....	1,372 sq. ft.
Weight, total.....	112,000 lbs.	Heating surface, total.....	1,505 sq. ft.
Wheel base, driving.....	8 ft. 0 in.	Grate surface.....	22.6 sq. ft.
Wheel base, engine.....	22 ft. 8 in.		

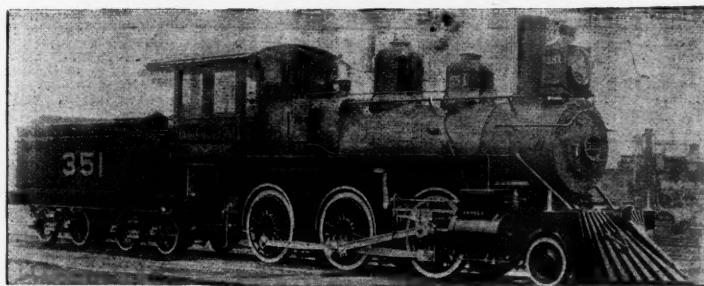


Fig. 11—Brooks.

Cylinders.....	19 x 24 in.	Wheel base, engine and tender.....	49 ft.
Driving wheels, diam.....	.55 in.	Boiler, diam.....	.58 in.
Weight on drivers.....	102,000 lbs.	Heating surface, firebox.....	134 sq. ft.
Weight on truck.....	16,000 lbs.	Heating surface, tubes.....	1,232 sq. ft.
Weight, total.....	118,000 lbs.	Heating surface, total.....	1,366 sq. ft.
Wheel base, driving.....	14 ft.	Grate surface.....	21.7 sq. ft.
Wheel base, engine.....	22 ft. 6 in.		

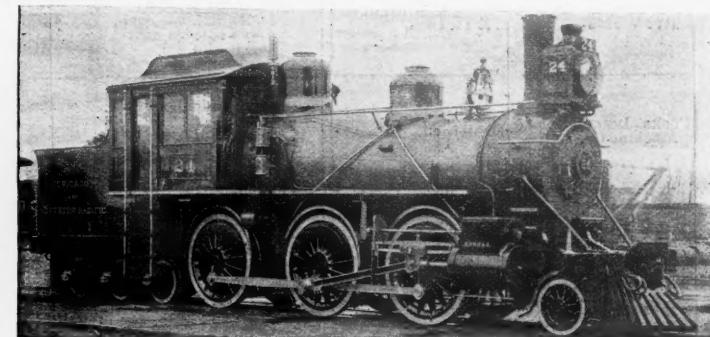


Fig. 15—Brooks.

Cylinders.....	18 x 24 in.	Wheel base, engine.....	35 ft. 9 in.
Driving wheels, diam.....	.63 in.	Wheel base, engine and tender.....	35 ft. 9 in.
Weight on drivers.....	102,000 lbs.	Boiler, diam.....	.58 in.
Weight on 2 wheel truck.....	16,000 lbs.	Heating surface, firebox.....	141 sq. ft.
Weight on 6 wheel truck.....	48,000 lbs.	Heating surface, tubes.....	1,453 sq. ft.
Weight, total.....	166,000 lbs.	Heating surface, total.....	1,597 sq. ft.
Wheel base, driving.....	15 ft.	Grate surface.....	22.6 sq. ft.

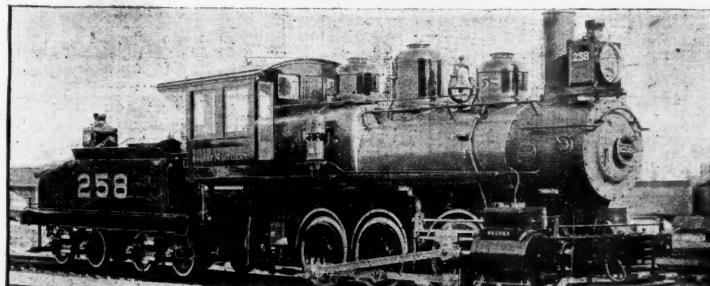


Fig. 12—Brooks.

Cylinders.....	19 x 26 in.	Boiler, diam.....	.58 in.
Driving wheels, diam.....	.49 in.	Heating surface, firebox.....	144 sq. ft.
Weight on drivers.....	114,700 lbs.	Heating surface, tubes.....	1,136 sq. ft.
Weight, total.....	114,700 lbs.	Heating surface, total.....	1,280 sq. ft.
Wheel base, driving.....	10 ft. 8 in.	Grate surface.....	21.7 sq. ft.
Wheel base, engine and tender.....	40 ft. 7 1/4 in.		

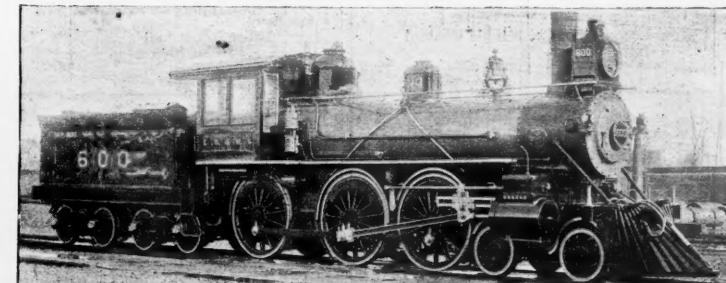


Fig. 16—Brooks.

Cylinders.....	17 x 24 in.	Wheel base, engine and tender.....	47 ft. 7 1/4 in.
Driving wheels, diam.....	.68 in.	Boiler, diam.....	.52 in.
Weight on drivers.....	88,500 lbs.	Heating surface, firebox.....	123 sq. ft.
Weight on truck.....	25,000 lbs.	Heating surface, tubes.....	1,462 sq. ft.
Weight, total.....	113,500 lbs.	Heating surface, total.....	1,583 sq. ft.
Wheel base, driving.....	15 ft.	Grate surface.....	28.0 sq. ft.
Wheel base, engine.....	25 ft. 1 1/2 in.		

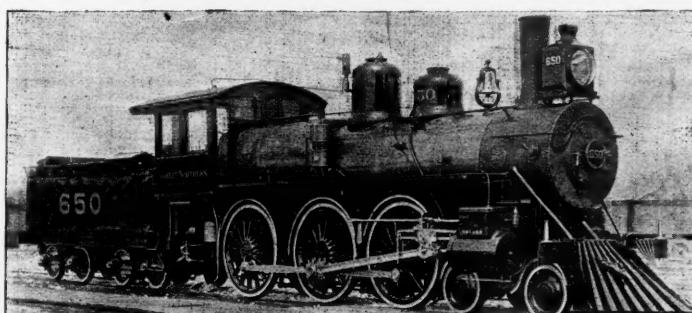


Fig. 13—Brooks.

Cylinders.....	19 x 26 in.	Wheel base, engine and tender.....	52 ft. 3 3/4 in.
Driving wheels, diam.....	.72 in.	Boiler, diam.....	.69 in.
Weight on drivers.....	111,000 lbs.	Heating surface, firebox.....	152 sq. ft.
Weight on truck.....	27,000 lbs.	Heating surface, tubes.....	1,646 sq. ft.
Weight, total.....	138,000 lbs.	Heating surface, total.....	1,798 sq. ft.
Wheel base, driving.....	14 ft. 6 in.	Grate surface.....	25.3 sq. ft.
Wheel base, engine.....	25 ft.		

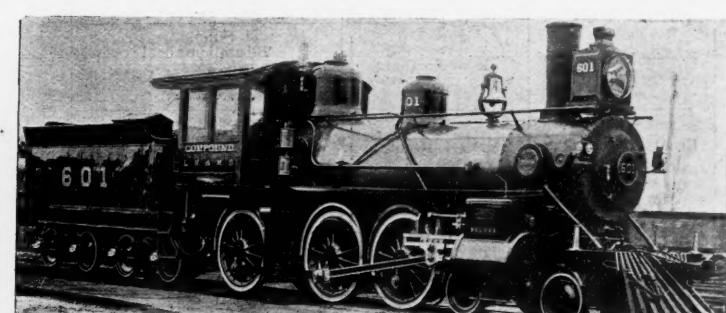


Fig. 17—Brooks Compound.

Cylinders.....	18 and 28 1/2 x 24 in.	Wheel base, engine and tender.....	45 ft. 6 1/4 in.
Driving wheels, diam.....	.56 in.	Boiler, diam.....	.52 in.
Weight on drivers.....	76,500 lbs.	Heating surface, firebox.....	112 sq. ft.
Weight on truck.....	25,000 lbs.	Heating surface, tubes.....	1,163 sq. ft.
Weight, total.....	102,000 lbs.	Heating surface, total.....	1,260 sq. ft.
Wheel base, driving.....	13 ft. 3 in.	Grate surface.....	23 sq. ft.
Wheel base, engine.....	23 ft. 1 1/2 in.		

that followed indicated that all the members considered discipline of employee as most essential to the proper conduct of railroad matters and that the employee as a rule derived decidedly more benefit from good discipline than the railroad company. It also developed that the best practice seems to be to use water columns on railroads and to place all water tanks back some distance from the main tracks. The representatives of several very large railroad systems emphasized that they would not allow any water tank to be placed next to the track and that the improvements in the details of water columns were to-day

such as not to give any trouble in winter, if all necessary precautions are taken.

Relative to the crawling of rails, especially with its effect on bridges: Without exception the speakers emphasized the necessity of not spiking the track on bridges, by spikes in slots of the rails or angles, so as to prevent the free longitudinal movement of the rails on the bridges in every direction. This is absolutely necessary if the bridge is to be protected from the objectionable features of rails crawling on it. Most railroads represented seemed to have strict rules on this subject issued to the track department. The committee's con-

clusion to stop the crawling of rails by spiking in slots in the rails on each side of the bridge, if necessary going a mile each way, can hardly be considered as a satisfactory solution and answer; especially as it throws the solution of this important question simply into another department of railroading.

The discussion on guard rails, inside and outside, was quite lively, but consisted mainly of the individual views and experiences of members, in which connection some remarkable feats of derailed railroad cars, traveling for 35 miles or more over the ties without calling the attention of trainmen to it, were told with considerable ear-

LOCOMOTIVES AT THE COLUMBIAN EXPOSITION.—SECOND ARTICLE.

DETAILS OF LOCOMOTIVES EXHIBITED AT THE WORLD'S COLUMBIAN EXPOSITION.—SECOND ARTICLE.

*Illustrations and principal dimensions of these locomotives are shown on preceding pages.**Explanation of Table.—The first line of the heading in each column refers to the first line of data for each engine; the second line for the second line of data, and so for the four or five lines of heading in each column.*

Cut number.	Name of builder.	Name of company for which built.	Simple or compound. Kind of fuel. Gage. Name or number.	Center to center, main connecting rod. Horizontal thickness of piston. Kind of piston packing. Piston rod, diameter. Size of steam ports.	Exhaust ports, size. Valve, greatest travel. Valve, outside lap. Valve, inside lap. Valve, lead.	Journals, driving axle, size. Journal, truck axle, size. Journal, main crank pin, size. Journal, coupling rod, size.
1	Rhode Island Locomotive Works	Minneapolis, St. Paul & Sault Ste Marie	Compound Bituminous coal 4 ft. 8½ in. No. 402	119½ in. H. P., 6 in.; L. P., 5½ to 7 in. Cast iron spring ring 3½ in. H. P., 20 × 1¾ in.; L. P., 25 × 1¾ in.	H. P., 20 × 3 in.; L. P., 25 × 3 in. 6¾ in. H. P., 1 in.; L. P., ¾ in. H. P., ¾ in.; L. P., ¾ in. H. P., ½ in.; L. P., ½ in.	7½ × 8 in. 5½ × 8 in. 6 × 6 in. 1st and 4th. 4 × 3½ in.; 2d, 4½ × 4½ in.; main, 6½ × 5 in.
2	Rhode Island Locomotive Works	New York, New Haven & Hartford	Compound Anthracite coal 4 ft. 8½ in. No. 254	82½ in. H. P., 6 in.; L. P., 5 to 6 in. Cast iron spring ring 3½ in. H. P., 20 × 1¾ in.; L. P., 25 × 1¾ in.	H. P., 20 × 3 in.; L. P., 25 × 3 in. 6¾ in. H. P., 1 in.; L. P., ¾ in. H. P., ¾ in.; L. P., ¾ in. H. P., ½ in.; L. P., ½ in.	8 × 11½ in. 5½ × 8 in. 6½ × 6 in. 5 × 4½ in.
3	Rhode Island Locomotive Works	Chicago, Milwaukee & St. Paul	Compound Bituminous coal 4 ft. 8½ in. No. 230	123½ in. H. P., 6 in.; L. P., 5 to 6 in. Cast iron spring ring 3½ in. H. P., 20 × 1¾ in.; L. P., 25 × 1¾ in.	H. P., 20 × 3 in.; L. P., 25 × 3 in. 6¾ in. H. P., 1 in.; L. P., ¾ in. H. P., ¾ in.; L. P., ¾ in. H. P., ½ in.; L. P., ½ in.	8 × 8½ in. { 5½ × 10 in. F. } { 6 × 10 in. B. } 6½ × 6 in. Front and back, 5 × 3½ in. Main, 6½ × 5½ in.
4	Cooke Locomotive & Machine Co.	Exhibition	Simple Soft coal 4 ft. 8½ in. "No. 2,252"	6 in. Cast iron spring ring 3½ in. 20 × 1¾ in.	20 × 3 in. 5½ in. ¾ in. None ½ in.	8 in. dia. × 10 in. 5½ in. dia. × 10 in. Main, 6 in. dia. × 5½ in.; F. and B., 4½ × 3½ in.
5	Cooke Locomotive & Machine Co.	Eric Engineers	Simple Anthracite coal 4 ft. 8½ in. "E. B. Thomas"	6 in. Dunbar 3½ in. 18 × 1¾ in.	18 × 3½ in. 6 in. 1 in. ½ in. ½ in.	8½ in. dia. × 12 in. 6 in. dia. × 5½ in. 5½ in. dia. × 6 in. 4½ in. dia. × 4½ in.
6	Rogers Locomotive Co.	Charleston & Savannah Ry.	Simple Bituminous coal 4 ft. 9 in. No. 100	10 ft. 5½ in. 5 in. C. I. rings on T-ring 3½ in. 19 × 1¾ in.	19 × 3½ in. 5½ in. 1 in.	8 × 10 in. 5½ × 12 in. 5½ × 5½ in. M., 5½ × 5 in.; F. and B., 4½ × 4 in.
7	Rogers Locomotive Co.	Chicago, Burlington & Quincy.	Simple Bituminous coal 4 ft. 8½ in. No. 550	7 ft. 2½ in. 4½ in. Dunbar 3½ in. 17½ × 1¾ in.	17½ × 3½ in. 6 in. 1½ in. Inside clearance, ½ in. ½ in.	8 × 9½ in. 5½ × 9 in. 5 × 5 in. 4 × 3½ in.
8	Rogers Locomotive Co.	Illinois Central	Simple Bituminous coal 4 ft. 8½ in. "No. 638"	6 ft. 10½ in. 6 in. C. I. spring rings on solid head 3½ in. 18 × 1¾ in.	18 × 2½ in. 5½ in. 1½ in. ½ in.	8 × 10 in. 5 × 10 in. 6 × 6 in. M., 6½ × 5 in.; I. M., 5½ × 4½ in.; F. and B., 4½ × 4 in.
9	Brooks Locomotive Works	Great Northern	Simple Bituminous coal 4 ft. 8½ in. No. 410	8 ft. 3 in. 5 in. Bull and snap ring 3½ in. 18½ in. × 1¾ in.	18½ in. × 3 in. 6½ in. ¾ in. ½ in. ½ in.	8 in. × 9 in. 5½ in. × 10 in. 6 in. × 6 in. F., 4½ in. × 4½ in.; M., 7 in. × 5 in.; Third, 5 in. × 5 in.; Rear, 4½ in. × 4½ in.
10	Brooks Locomotive Works	Great Northern	Four cylinder compound Bituminous coal 4 ft. 8½ in. No. 515	10 ft. 9 in. H. P., 4½ in.; L. P., 6 in. C. I. rings sprung on solid head 3½ in. H. P., 1½ in. for piston valve; 12 in. dia.; L. P., 2 in. × 20 in.	H. P., piston valve; L. P., 5 in. × 20 in. H. P., 7 in.; L. P., 4 in. H. P., ½ in.; L. P., ¾ in. H. P., ½ in. neg.; L. P., ¼ in. neg. H. P., none; L. P., ½ in.	8 in. × 9 in. 5½ in. × 10 in. 5½ in. × 6 in. F., 4 in. × 3½ in.; Second, 5 in. × 4 in.; M., 6½ in. × 5 in.; Rear, 4½ in. × 3½ in.
11	Brooks Locomotive Works	Great Northern	Simple Bituminous coal 4 ft. 8½ in. No. 351	7 ft. 1 in. 5 in. Bull and snap ring 3½ in. 18½ in. × 1¾ in.	18½ in. × 3 in. 6½ in. ¾ in. ½ in. ½ in.	8 in. × 9 in. 5½ in. × 10 in. 5½ in. × 6 in. F., 4 in. × 3½ in.; M., 6½ in. × 5 in.; Rear, 4½ in. × 3½ in.
12	Brooks Locomotive Works	Great Northern	Simple Bituminous coal 4 ft. 8½ in. No. 258	10 ft. 9 in. 5 in. Bull and snap ring 3½ in. 18½ in. × 1¾ in.	18½ in. × 3 in. 6½ in. ¾ in. ½ in. ½ in.	8 in. × 9 in. 5½ in. × 10 in. 5½ in. × 6 in. F., 4 in. × 3½ in.; Second, 5 in. × 4 in.; M., 6½ in. × 5 in.
13	Brooks Locomotive Works	Great Northern	Simple Bituminous coal 4 ft. 8½ in. No. 630	9 ft. 10 in. 5 in. Bull and snap ring 3½ in. 18½ in. × 1¾ in.	18½ in. × 3 in. 6½ in. 1 in. ½ in. ½ in.	8 in. × 9½ in. 5½ in. × 10 in. 5½ in. × 6 in. F., 4½ in. × 4½ in.; M., 6½ in. × 5 in.; Rear, 4½ in. × 4½ in.
14	Brooks Locomotive Works	Cincinnati, Hamilton & Dayton	Simple Bituminous coal 4 ft. 8½ in. No. 210	7 ft. 6½ in. 5 in. Dunbar 3½ in. 17 in. × 1¾ in.	17 in. × 3 in. 6 in. 1 in. ½ in. ½ in.	8 in. × 9½ in. 5½ in. × 10 in. 5½ in. × 6 in. 4½ in. × 3½ in.
15	Brooks Locomotive Works	Chicago & Northern Pacific	Simple Bituminous coal 4 ft. 8½ in. No. 24	7 ft. 3 in. 5 in. Solid head and snap ring 3½ in. 17 in. × 1¾ in.	17 in. × 3 in. 6½ in. ¾ in. ½ in. ½ in.	7½ in. × 9 in. 5 in. × 10 in. F., 5 in. × 10 in. B. 5½ in. × 7 in. F. and B., 4½ in. × 3½ in.; M., 6½ in. × 5 in.
16	Brooks Locomotive Works	Lake Shore & Michigan Southern	Simple Bituminous coal 4 ft. 8½ in. No. 690	9 ft. 6 in. 5 in. Dunbar 3½ in. 16 in. × 1¾ in.	16 in. × 3 in. 6 in. 1 in. ½ in. ½ in.	7½ in. × 9 in. 5 in. × 10 in. 4½ in. × 6 in. F. and B., 3½ in. × 3½ in.; M., 5½ in. × 4½ in.
17	Brooks Locomotive Works	Lake Shore & Michigan Southern	Two cylinder compound Bituminous coal 4 ft. 8½ in. No. 601	8 ft. 3 in. H. P., 5 in.; L. P., 7 in. H. P., Dunbar; L. P., solid head and snap ring 3½ in. H. P., 16 in. × 1¾ in.; L. P., 20 in. × 2½ in.	H. P., 16 in. × 3 in.; L. P., 20 in. × 5 in. H. P., 6½ in.; L. P., 6 in. H. P., ½ in.; L. P., 1½ in. H. P., ½ in. neg.; L. P., ¼ in. neg. H. P., none; L. P., ½ in.	7 in. × 8 in. 4½ in. × 10 in. 4½ in. × 6 in. F. and B., 3½ in. × 3½ in.; M., 5½ in. × 4½ in.

*Photograph is of an engine similar to the one exhibited.

nestness, and the part that certain bridge guard rails or rerailing devices had played brought out forcibly.

The committee's report to the effect that the best bridge from 130 ft. up was an all iron bridge found no serious opposition in the meeting. The report on the best method of elevating track upon bridges and trestles, which was very complete and instructive, brought out some discussion on the value of shims and other devices, but owing to the limited time further discussion had to be postponed until next year's meeting.

In connection with these discussions it might be well to emphasize the value of a representative body of practical railroaders, aiming to give some actual, practical and tangible result to the labor and care bestowed upon the preparation of committee reports and the discussions in open meeting, which discussions form one of the most valuable means for any society to bring out practical suggestions, which are not otherwise easily obtained by the technical and railroad fraternity. Such subjects as are adapted to the purpose should be crystallized, and in that shape submitted for adoption

by the Convention as a society. This would add more weight and value to the proceedings. The Society of Bridge and Building Superintendents, while still in its infancy, will undoubtedly grow to be influential and respected. The discussions and proceedings at the Convention show that Bridge and Building Superintendents are a body of well-educated and wide-awake, practical railroad men, who come together in their earnest desire to impart information to each other and thereby improve the class of work in their care on railroads.

DETAILS OF LOCOMOTIVES EXHIBITED AT THE WORLD'S COLUMBIAN EXPOSITION.—SECOND ARTICLE.

Illustrations and principal dimensions of these locomotives are shown on preceding pages.

Explanation of Table.—The first line of the heading in each column refers to the first line of data for each engine; the second line for the second line of data, and so for the four or five lines of heading in each column.

Boiler, type. Boiler, material in barrel. Boiler, thickness of barrel. Boil'r, kind of horizontal seams. Boiler, kind of circum- ferential seams.	Tubes, material. Tubes, number. Tubes, diameter outside. Tubes, length over tube plate. Firebox, length.	Firebox, width. Firebox, depth. Water space, width. Material of outside shell of firebox. Thickness of outside shell of firebox.	Material, inside of fire- box. Thickness of firebox. Material, firebox tube sheet. Material, smokebox tube sheet. Thickness of tube sheets.	Crown plate stayed with— Diameter and height of dome. Working steam pres- sure per square inch. Kind of grate.	Tender, weight empty. Journals, tender axles, size. Blast nozzle, kind. Blast nozzles, diam- eters.	Tender, fuel capacity. Tank, water capacity. Wheel base, total, en- gine and tender. Total length of engine and tender over all.
Extended wagon top Steel $\frac{5}{8}$ in. Triple riveted butt Double riveted lap	Charcoal iron 216 2 in. O. D. 13 ft. 8 in.	33 $\frac{1}{4}$ in. 70 $\frac{1}{4}$ in. F.; 62 $\frac{1}{4}$ in. B. $\frac{3}{4}$ in. Steel	Steel All $\frac{3}{8}$ in. Steel Steel	Radial stays, 1 $\frac{1}{2}$ in. diam. 30 in. diam.; 24 in. high 180 lbs. Rocking	33,000 lbs. 4 $\frac{1}{2}$ x 7 in. Single $5 \times \frac{5}{8}$ in.	7 tons 3,800 galls. 49 ft. 10 $\frac{1}{4}$ in. 59 ft. 4 $\frac{1}{4}$ in.
Extended wagon top Steel $\frac{5}{8}$ in. Triple riveted butt Double riveted lap	Steel 250 2 in. O. D. 10 ft. 9 in.	41 $\frac{1}{4}$ in. 69 in. F.; 60 in. B. $\frac{3}{4}$ in. Steel	Steel All $\frac{3}{8}$ in. Steel Steel	Radial stays, 1 $\frac{1}{2}$ in. diam. 30 in. diam.; 16 in. high 200 lbs. Water tubes with pull-out bars	31,000 lbs. 4 $\frac{1}{2}$ x 8 in. Variable	5 tons 4,000 galls. 47 ft. 6 $\frac{1}{4}$ in. 58 ft. 6 in.
Extended wagon top Steel $\frac{5}{8}$ in. Triple riveted butt Double riveted lap	Charcoal iron 272 2 in. O. D. 12 ft. 8 $\frac{1}{2}$ in. 120 $\frac{1}{4}$ in.	33 $\frac{1}{4}$ in. 82 $\frac{1}{4}$ in. F.; 72 $\frac{1}{4}$ in. B. $\frac{3}{4}$ in. Steel $\frac{5}{8}$ in.	Sides, $\frac{1}{8}$ in.; Crown and B., $\frac{3}{8}$ in.; Steel Steel $\frac{5}{8}$ in.	Radial stays, 1 $\frac{1}{2}$ in. diam. 30 in. diam.; 20 in. high 200 lbs. Rocking	31,000 lbs. 4 $\frac{1}{2}$ x 8 in. Variable	6 tons 4,000 galls. 50 ft. 6 $\frac{1}{4}$ in. 63 ft. 3 $\frac{1}{4}$ in.
Wagon top Steel $\frac{5}{8}$ in. Butt, with straps in, and out. Double riveted lap	Iron 227 2 $\frac{1}{2}$ in. 12 w. g. 13 ft. 6 in.	33 $\frac{1}{4}$ in. 75 $\frac{1}{4}$ in. F.; 61 $\frac{1}{4}$ in. B. 3 in. S.; 3 $\frac{1}{2}$ in. B.; 4 in. F. Steel	Steel 1 $\frac{1}{8}$ in. S.; $\frac{3}{8}$ in. B. and Crown	With bars and 1 in. bolts 29 in. diam.; 24 in. high 160 lbs. Cast-iron rocking	37,000 lbs. 4 $\frac{1}{2}$ in. diam. x 8 in. Single $4 \frac{1}{2}$ in.	6 $\frac{1}{2}$ tons 3,700 galls. 49 ft. 5 $\frac{1}{4}$ in. 59 ft. 10 $\frac{1}{4}$ in.
Straight Steel $\frac{5}{8}$ in. Butt, strips in, and out. Double riveted lap	Iron 272 2 in. 12 w. g. 12 ft. 1 in. 126 in.	41 $\frac{1}{4}$ in. 63 $\frac{1}{4}$ in. F.; 56 in. B. 3 $\frac{1}{2}$ in. S. and B.; 4 in. F. Steel $\frac{5}{8}$ in.	Steel 1 $\frac{1}{8}$ in. S.; $\frac{3}{8}$ in. B. and Crown	Radial stays 29 in. I. diam.; 24 in. high 180 lbs. Water tube and pull bar	37,000 lbs. 4 $\frac{1}{2}$ in. diam. x 8 in. Double $3 \frac{1}{2}$ in.	6 $\frac{1}{4}$ tons 3,700 galls. 48 ft. 11 $\frac{1}{4}$ in. 60 ft. 4 $\frac{1}{4}$ in.
Extended wagon top Steel $\frac{5}{8}$ and $\frac{1}{2}$ in. Butt, with double covering strips Double riveted lap	Iron 212 2 in. 14 ft. 4 in.	42 in. F., 64 in.; B., 55 in. 3 $\frac{1}{2}$ in. B. and S.; 4 in. F. Steel	Steel $\frac{5}{8}$ in. Steel Steel $\frac{5}{8}$ in.	Radial stays, 1 in. diam. 29 in. I. diam.; 26 in. high 170 lbs. Rocking	31,000 lbs. 4 $\frac{1}{2}$ x 8 in. Single 5 in.	7 tons 3,500 galls. 52 ft. 2 in. 59 ft. 6 in.
Belpaire Steel $\frac{5}{8}$ and $\frac{1}{2}$ in. Butt, with double covering strips Double riveted lap	Iron 217 2 in. 11 ft. 6 $\frac{1}{2}$ in.	42 in. F., 60 in.; B., 48 in. 3 in. Steel	Steel $\frac{5}{8}$ in. Steel Steel	Stays, $\frac{1}{8}$ in. diam. 27 $\frac{1}{4}$ in. inside; 27 $\frac{1}{4}$ in. high 165 lbs. Rocking	30,000 lbs. 4 $\frac{1}{2}$ x 8 in. Single $4 \frac{1}{2}$ in.	7 tons 3,480 galls. 48 ft. 3 in. 57 ft. 5 in.
Belpaire Steel $\frac{5}{8}$ and $\frac{1}{2}$ in. Butt, with double covering strips Double riveted lap	Iron 238 2 in. 11 ft. 10 $\frac{1}{2}$ in.	33 $\frac{1}{4}$ in. F., 71 $\frac{1}{4}$ in.; B., 62 $\frac{1}{4}$ in. 3 $\frac{1}{2}$ in. B. and S.; 4 in. F. Steel	Steel S. and B., $\frac{1}{8}$ in.; Crown, $\frac{3}{8}$ in. Steel Steel	Stays, 1 in. diam. 29 in. inside; 28 in. high 165 lbs. Rocking	32,000 lbs. 4 $\frac{1}{2}$ x 8 in. Single 5 in.	7 tons 3,850 galls. 47 ft. 9 $\frac{1}{2}$ in. 58 ft. 6 in.
Belpaire Steel $\frac{5}{8}$ in. Quadruple riveted Double riveted	Iron, No. 11 W. G. 250 2 $\frac{1}{4}$ in. 13 ft. 10 in. 114 in.	32 in. 76 $\frac{1}{4}$ in. F.; 73 $\frac{1}{4}$ in. B. 3 $\frac{1}{2}$ in. S. and B.; 4 in. F. Steel $\frac{5}{8}$ in.	Steel S. and B., $\frac{1}{8}$ in.; C., $\frac{3}{8}$ in. Steel Steel $\frac{5}{8}$ in.	Belpaire stays, 1 in. dia. 21 x 34 in. 180 lbs. Rocking	35,400 lbs. 4 $\frac{1}{2}$ x 8 in. Single $4 \frac{1}{2}$ in., 5 in., 5 $\frac{1}{4}$ in.	8 tons 4,000 galls. 52 ft. 3 $\frac{1}{4}$ in. 61 ft. 9 in.
Belpaire Steel $\frac{5}{8}$ in. Quadruple riveted Double riveted	Iron, No. 11 W. G. 208 2 $\frac{1}{4}$ in. 11 ft. 7 $\frac{1}{2}$ in. 114 in.	32 in. 71 in. F.; 68 in. B. 3 $\frac{1}{2}$ in. S. and B.; 4 in. F. Steel $\frac{5}{8}$ in.	Steel S. and B., $\frac{1}{8}$ in.; C., $\frac{3}{8}$ in. Steel Steel $\frac{5}{8}$ in.	Belpaire stays, 1 in. dia. 31 x 34 in. 180 lbs. Rocking	35,400 lbs. 4 $\frac{1}{2}$ x 8 in. Single $4 \frac{1}{2}$ in., 5 in., 5 $\frac{1}{4}$ in.	8 tons 4,000 galls. 49 ft. 11 $\frac{1}{4}$ in. 60 ft. 3 in.
Belpaire Steel $\frac{5}{8}$ in. Quadruple riveted Double riveted	Iron, No. 11 W. G. 212 2 in. 11 ft. 7 $\frac{1}{2}$ in. 98 in.	32 in. 67 in. F.; 50 in. B. 3 $\frac{1}{2}$ in. S. and B.; 4 in. F. Steel $\frac{5}{8}$ in.	Steel S. and B., $\frac{1}{8}$ in.; C., $\frac{3}{8}$ in. Steel Steel $\frac{5}{8}$ in.	Belpaire stays, 1 in. dia. 31 x 34 in. 180 lbs. Rocking	35,400 lbs. 4 $\frac{1}{2}$ x 8 in. Single $4 \frac{1}{2}$ in., 5 in., 5 $\frac{1}{4}$ in.	8 tons 4,000 galls. 48 ft. 1 $\frac{1}{4}$ in. 58 ft. 3 in.
Belpaire Steel $\frac{5}{8}$ in. Quadruple riveted Double riveted	Iron, No. 11 W. G. 174 2 $\frac{1}{4}$ in. 11 ft. 1 $\frac{1}{2}$ in. 98 in.	32 in. 63 in. F.; 65 in. B. 3 $\frac{1}{2}$ in. S. and B.; 4 in. F. Steel $\frac{5}{8}$ in.	Steel S. and B., $\frac{1}{8}$ in.; C., $\frac{3}{8}$ in. Steel Steel $\frac{5}{8}$ in.	Belpaire stays, 1 in. dia. 31 x 34 in. 180 lbs. Rocking	34,000 lbs. 4 $\frac{1}{2}$ x 8 in. Single $4 \frac{1}{2}$ in., 4 $\frac{1}{2}$ in., 5 $\frac{1}{4}$ in.	5 tons 3,100 galls. 40 ft. 7 $\frac{1}{4}$ in. 51 ft. 8 $\frac{1}{4}$ in.
Belpaire Steel $\frac{5}{8}$ in. Quadruple riveted Double riveted	Iron, No. 11 W. G. 202 2 $\frac{1}{4}$ in. 13 ft. 10 in. 114 in.	32 in. 69 in. F.; 55 in. B. 3 $\frac{1}{2}$ in. S. and B.; 4 in. F. Steel $\frac{5}{8}$ in.	Steel S. and B., $\frac{1}{8}$ in.; C., $\frac{3}{8}$ in. Steel Steel $\frac{5}{8}$ in.	Belpaire stays, 1 in. dia. 31 x 34 in. 180 lbs. Rocking	35,400 lbs. 4 $\frac{1}{2}$ x 8 in. Single $4 \frac{1}{2}$ in., 4 $\frac{1}{2}$ in., 5 $\frac{1}{4}$ in.	8 tons 4,000 galls. 52 ft. 3 $\frac{1}{4}$ in. 62 ft. 2 $\frac{1}{4}$ in.
Belpaire Steel $\frac{5}{8}$ in. Quadruple riveted Double riveted	Iron, No. 12 W. G. 236 2 in. 11 ft. 7 $\frac{1}{2}$ in. 102 in.	32 in. 67 in. F.; 54 in. B. 3 $\frac{1}{2}$ in. S. and B.; 4 in. F. Steel $\frac{5}{8}$ in.	Steel S. and B., $\frac{1}{8}$ in.; C., $\frac{3}{8}$ in. Steel Steel $\frac{5}{8}$ in.	Belpaire stays, 1 in. dia. 31 x 34 in. 180 lbs. Rocking	31,800 lbs. 4 $\frac{1}{2}$ x 8 in. Single $4 \frac{1}{2}$ in., 4 $\frac{1}{2}$ in., 5 in.	8 tons 4,200 galls. 46 ft. 8 in. 57 ft. 5 in.
Wagon Top Steel $\frac{5}{8}$ in. Quadruple riveted Double riveted	Iron, No. 13 W. G. 250 2 in. 11 ft. 1 $\frac{1}{2}$ in. 102 in.	32 in. 68 $\frac{1}{4}$ in. F.; 54 $\frac{1}{4}$ in. B. 3 $\frac{1}{2}$ in. S. and B.; 4 in. F. Steel $\frac{5}{8}$ in.	Steel S. and B., $\frac{1}{8}$ in.; C., $\frac{3}{8}$ in. Steel Steel $\frac{5}{8}$ in.	Crown bar stays 31 x 25 in. 180 lbs. Rocking	No Tender None Single $4 \frac{1}{2}$ in., 4 $\frac{1}{2}$ in., 5 in.	4 $\frac{1}{2}$ tons 2,600 galls. 35 ft. 9 in. 46 ft. 10 in.
Wagon Top Steel $\frac{5}{8}$ in. Quadruple riveted Double riveted	Iron, No. 13 W. G. 202 2 in. 13 ft. 10 $\frac{1}{2}$ in. 96 in.	42 in. 64 in. F.; 50 in. B. 3 $\frac{1}{2}$ in. S.; 3 in. B.; 4 in. F. Steel $\frac{5}{8}$ in.	Steel S. and B., $\frac{1}{8}$ in.; C., $\frac{3}{8}$ in. Steel Steel $\frac{5}{8}$ in.	Crown bar stays 31 x 25 in. 180 lbs. Rocking	33,500 lbs. 4 $\frac{1}{2}$ x 8 in. Double 3 in., 3 $\frac{1}{2}$ in., 3 $\frac{1}{4}$ in.	6 tons 3,700 galls. 47 ft. 7 $\frac{1}{4}$ in. 58 ft. 3 $\frac{1}{4}$ in.
Wagon Top Steel $\frac{5}{8}$ in. Quadruple riveted Double riveted	Iron, No. 13 W. G. 186 2 in. 12 ft. 1 $\frac{1}{2}$ in. 96 in.	34 $\frac{1}{4}$ in. 64 in. F.; 50 in. B. 3 in. S. and B.; 4 in. F. Steel $\frac{5}{8}$ in.	Steel S. and B., $\frac{1}{8}$ in. in. C. Steel	Crown bar stays 31 x 27 in. 180 lbs.	33,500 lbs. 4 $\frac{1}{2}$ x 8 in. Single	6 tons 3,700 galls. 45 ft. 6 $\frac{1}{4}$ in.
				Rocking	5 in., 5 $\frac{1}{4}$ in.	54 ft. 11 in.

The subjects for which committees were appointed to report at the next convention were: Bridge Inspection; Depressed Cinder Pits and Other Kinds; Best Foundations for Track Scales; Boilers and Pumps for Water Stations; Construction and Maintenance of Pile and Trestle Bridges; Interlocking Signals.

Representatives of the Chesapeake & Ohio, Baltimore & Ohio, Philadelphia & Reading and New York, Philadelphia & Norfolk offered the members present, with their families, the courtesies of their respective roads. The Convention adjourned at 4 p. m., Thursday, Oct. 19, to meet on the third Tuesday of October next year at Kansas City, Mo.

Chicago Meeting of Superintendents' Society.

Two of the papers read at the Chicago meeting of the American Society of Railroad Superintendents did not appear in our report last week, and are crowded out for lack of room; they are those of Mr. Royce, of the Chicago, Rock Island & Pacific, and Mr. Derr, of the Erie. Mr. Royce gave a very interesting sketch of the history of electricity and of the principal inventions connected with it. He said little, however, about the present state of the electric arts as connected with railroads except to describe a telephone exchange which the Rock Island has lately established in Chicago.

The new terminal freight yard of this road is at Blue Island, 17 miles from the general office in the city, and the numerous offices at headquarters are connected with the principal offices at the yards and with the other yards between the termini of the line, by a metallic circuit of copper wire. Long distance telephones are used, and there is an exchange in the general office building. The whole plant is rented from the telephone company at about \$4,000 a year, and gives complete satisfaction. The services of several telegraph operators were dispensed with when the telephone line was established. Mr. Derr's paper was a brief sketch of some of the principal signal exhibits at the World's Fair. A large

part of the information that he gives is familiar to readers who have followed the descriptions of signaling appliances published in the *Railroad Gazette*, but we quote a few extracts from the paper referring to devices not so well known:

"Among the Pennsylvania exhibits is found the Union Switch & Signal Co.'s pneumatic interlocking system. The use of electrically controlled valves at switch movements, the application of storage batteries instead of gravity cells for furnishing electric currents, and the application of the Saxby & Farmer improved locking (one-half the usual size) are some of the newer and more interesting features of the pneumatic machine. The use of storage batteries permits a closer regulation of quantity and pressure of current, and results in a considerable economy in expense of operation. The application of the Saxby & Farmer improved locking to the pneumatic machine permits close and accurate interlocking of levers and dispenses with a large amount of costly electrical work in the machine."

"The Johnson Railroad Signal Co. shows a light commutator, in which electricity is employed, to indicate to the signalman that a signal light is 'in' or 'out.' The contraction of certain rods in the machine caused by the light being out breaks a circuit, thereby releasing the armature of a magnet located in the signal station. This causes a bell to ring, and also gives visual notice by showing the word 'out' on the miniature signal."

"The London & Northwestern Railway exhibits a Webb & Thompson staff machine so arranged that more than one train can be sent into a block in the same direction consecutively. This machine has a special staff contained in a separate slot. The special staff is used in connection with six metal train tickets, providing for the movement of seven trains. It is a key to unlock a box containing the train tickets, and is withdrawn from the machine in the same manner as the ordinary staves. After unlocking the box and taking out all the tickets the box is again locked. The tickets are given out to trains, permitting them to enter the block. The last train takes the staff and any remaining tickets. After all the tickets and the special staff are delivered at either end of the block the tickets are locked up and the staff placed in the machine. The line is then again clear. The machine is so arranged that the special staff cannot be restored until all the tickets have been locked up in one box. When the special staff is withdrawn no other staff can be removed, and vice versa. There is but one special staff and set of tickets for each block, and they must always be in one machine. Both the ordinary and special staves are keys to unlock switches, and are so arranged that they cannot be withdrawn from the switchlock without locking switch for main track."

"Chicago Day" Transportation.

The Chicago day celebration at Jackson Park on Oct. 9, the 22d anniversary of the fire, brought out a crowd which taxed to the utmost the capacity of the various transportation lines of the vicinity. The influx of passengers from outside points was of course unprecedented and drove the managers of the various railroad companies to their wits' end to devise means of transportation. As for the lines leaving from various parts of the city to Jackson Park, they were fairly swamped.

The Alley Elevated Road had in service its full equipment of 180 cars and ran its trains at intervals of three minutes the entire day. The number of passengers carried as shown by cash sales reached a total of 24,800. This does not represent the entire number carried as many of the patrons of the road buy 50 cents or a dollar's worth of tickets at a time and are thus prepared to avoid the crowds at the ticket offices on busy days. During the early part of the day and in the late afternoon trains from Congress street were packed to their utmost capacity. Travel in the other direction was heavy all day, especially so during the late afternoon and evening. At the Congress street station passengers were admitted to the platform both on Congress street and Harrison street and both streets were filled the greater part of the forenoon with people trying to get to the trains. Trains leaving the Congress street station were so crowded that it was impossible to take passengers on at the intermediate stations, and in order to handle them it was found necessary to run occasional empty trains up the line from the Sixty-first street yards for their benefit. The rush was practically over at 11 o'clock p.m., though trains were run at frequent intervals until midnight.

On the Chicago City Railway Company's cable roads the traffic was particularly heavy and trains were run at short intervals on the Cottage Grove avenue line, and on the State street line which transfers at Sixty-first street to the electric road running to the Fair grounds. The cars gave evidence of good construction, as scarcely a train on the Cottage Grove avenue line left the city without a number of passengers on the roof of the cars. The total number of passengers carried on the lines of this company for the 24 hours was 757,600. It is estimated that of this number 500,000 were handled by the cable lines, 90,000 by the electric and the remainder by the horse car lines.

The Illinois Central had all of its 300 World's Faircars in service between Van Buren street and the Fairgrounds and ran trains from early morning until midnight. Trains were run from Van Buren street over two terminal tracks, at intervals as short as their block signal system would allow. The exact number of passengers carried on this line cannot be determined until the count of tickets is finished. It is known, however, that the traffic ran considerably over 280,000. In addition to this the company had in service all day 166 suburban coaches, and during the crowded part of the day 60 through passenger coaches and 40 excursion coaches, making a total of 566 coaches in use on this road. A careful estimate shows a total number carried of 541,312.

The facilities of the World's Fair Steamship Company for handling passengers seemed to be overlooked by the crowd, as but 50,000 to 60,000 were carried by their boats, a number considerably below their capacity.

The Chicago & Northern Pacific ran trains as often as possible and handled a total of about 30,800, most of whom came from the western part of the city. But four trains were run from the Grand Central station to the Fair grounds.

Probably the greater part of those reaching the Fair grounds from points south and southwest were handled by the Calumet Electric Street Railway Company, whose lines practically cover this territory. The total number of passengers carried was about 78,000.

The north and west side cable companies, which on the night of July 4 caused so much unfavorable comment by their action in furnishing only the usual number of trains, and discontinuing the cable service at the usual hour, redeemed themselves on this occasion by providing ample facilities for the transportation of their passengers from the center of the city.

Taken all in all, the handling of the 761,942 people present at the Exposition on Chicago Day was well done, and the management of the various roads contributing to its success deserve unlimited credit for their performance.

Railroad Receiverships in 1893.

We give below a list of the railroads which have been put into the hands of Receivers since July 1, 1893, amounting to 16,751 miles. Adding the list of receiverships from Jan. 1 to July 1, 5,282 miles, the total is 22,03 miles.

July 1 to Oct. 24.

Miles.	Miles.
Louisville Southern.....	123
No. Gal., Houston & Kan. City.....	25
N. Y., L. E. & W.	35
Pittsb., Akron & W.	1,918
Rio Grande & So.	165
Louisv., St. L. & Tex.	166
Hutchinson & So.	172
Northern Pacific.....	4,438
Phila., Read. & N. E.	179
Jacksonville S. E.	398
Lancaster & Hamden.	14
Wheeling Bridge & Tex.	6
Wisconsin Central.	808
Siu City & Northern.	93
<i>Total.</i>	<i>22,033</i>

* Does not include Central Branch or joint operated mileage, nor 108 miles on U. P., D. & G. operated under trackage contract.

Meeting of the American Street Railway Association.

The twelfth annual meeting of the American Street Railway Association was held in Milwaukee, Oct. 18 and 20, 1893. The President introduced Mayor Koch, of Milwaukee, who delivered an address of welcome. President Longstreet then delivered his annual address, a few extracts from which follow:

"This has been a busy year in the great work of consolidation, reorganization and active progression; the financial cloud perhaps has affected our business in a less degree than any other branch employing so large a capital. The hundreds of millions of dollars interested in urban and suburban transportation will always be a safe investment. . . . In my experience, covering a period of nearly thirty years, I have found it better to keep up the quality of service at such times even at the expense of dividends for the time being."

The report of the Executive Committee was read and showed that, after numerous consolidations among members, the present membership is 200 companies.

The committee considered at some length the formation of the American Street Railway Industrial Institute, and submitted a proposed Act of Incorporation. Later in the report, however, the committee reports: "This year has not been one in which to float new enterprises, and hence while the committee has had under consideration the subject of the formation of an Industrial Institute, we believe the time has not yet arrived to do more than commend to all the serious consideration of this important question."

The first report read was on "Power House Engines." The vertical type of engine is recommended; and the compound condensing engine is recommended for large size plants. . . . The vertical type takes less floor space than the horizontal, and in the horizontal type one is liable to have trouble with the piston; in the vertical type this is not so liable to happen.

Mr. CONNETTE, of the committee, discussing the report spoke of the 1,500-H. P. vertical compound condensing engine of the Intramural Railroad at the World's Fair, which has never been shut down an hour for repairs to the engine proper. It has hauled 13 trains of four cars heavily loaded, constantly, all day, while the other engines, those of the horizontal type, have required repairs.

The committee appointed to examine the engines in order to award premiums sat for 23 hours watching the engine work. It constantly pulled the whole load for 23 hours, with possibly not over one per cent. variation in the speed. The engine makes about 100 revolutions per minute, and it is said did not vary one revolution when the load was increased from, say, 50 per cent. to full load.

MR. ARNOLD, of Chicago: I believe in the vertical engine because it occupies less floor space. The greatest drawback is the first cost. An electric railroad engine, as we have heretofore installed them, is normally an underloaded engine, for we have believed

that we should have the large engine behind the generator in order to respond promptly to the overload which is liable to occur at any moment. As these overloads are intermittent and of short duration, we run our engines below their normal capacity the most of the time in order to be ready for the short excessive loads, and as these overloads are of short duration I believe it to be better engineering to allow the engine to work uneconomically during those periods by allowing the steam to follow the pistons a longer time, even to full stroke if necessary, for a few revolutions, until the overload ceases, then dropping back to its normal point of cut-off and operating at this point during the long intervals between overloads. If the generator is properly designed it is capable of standing a short overload of 40 per cent., and by strengthening the frames and main working parts of the engine it will easily give 50 per cent. more than its rated capacity, thus being able to stand the shocks of short circuits and overloads without damage.

Invitations were read from The E. P. Allis Company, of Milwaukee, the Pabst Brewing Company of Milwaukee, and the Intramural Railway Company at the Fair, to the delegates to visit their respective works. It was announced that the afternoon would be devoted to visiting the Allis works and the Pabst brewery and some of the depots and power stations of the Milwaukee Street Railway Company. The convention then adjourned until 8 o'clock.

At the Wednesday evening session Mr. O. T. Crosby was called upon to give his opinion of the relative conditions of the power required in generator and the engines. Mr. Crosby said that there had been a development of conservatism, and to-day when one speaks of a 500 H. P. engine and a 500 H. P. dynamo we may be pretty sure that he is talking about the same things. Mr. Crosby believes that the best practice is that an engine should be at least no greater in capacity than the dynamo to which it is attached, or perhaps the engine slightly lower in capacity. As between vertical and horizontal engines he thinks that it is in any one case a matter of special conditions, and he would not say, generally speaking, that direct connected generators are better than belt connections.

The next paper read was the Report of the Committee on Heating and Lighting of Street Railway Cars. The report considered the various methods of heating and lighting street cars. The conclusion was, considering all elements, that the best method of heating is by a primary heater fired with anthracite coal, operated from the inside of the car; that the best method of lighting is with electricity for electric roads, and gas, for example the Pintsch, for cables.

The Committee on the Use of T-Rails in Paved Streets had no report ready, but there was considerable discussion on the subject, and the great weight of evidence was in favor of such a rail. A number of speakers from various cities of the country spoke from their own experience as to the advantages of the T-rail, and there was little objection to it.

A very careful paper on the use of storage batteries in connection with central stations for utilizing surplus energy for lighting or power was read by Mr. Mailloux. The result of a very thorough consideration of the subject is summed up in ten "conclusions," which we shall further summarize as follows: Great progress has been made in Europe during the last two or three years in storage batteries; they have been introduced in central lighting stations on a large commercial working scale for reserve and regulation, with satisfactory financial results, as a rule. The benefits derived in lighting stations, from a judicious use of storage batteries, are so great that the matter should be carefully investigated for power stations. Indications point to the possibility of realizing an economy in all stations operating 200 cars and less when coal is worth \$2 a ton and over. The question of the use of storage batteries is one to be decided by investigation of each special case.

Mr. O. T. Crosby introduced John Fritz, of Bethlehem, but Mr. Fritz asked to be excused from making a speech.

On Thursday afternoon the first paper read was that on Direct Driven Generators, a considerable portion of which appeared in the *Railroad Gazette* last week.

The following officers were elected for the coming year: President, H. C. Payne, Milwaukee; Vice-President, W. J. Stephenson, Washington; J. R. Chapman, Grand Rapids; Lewis Perrins, Trenton; Secretary and Treasurer, W. J. Richardson, New York.

Atlanta was selected as the place for the next annual meeting.

Later Mr. Herbert Claude, of Washington, D. C., was introduced and described the underground conduit system which has been introduced in that city.

The convention closed with a banquet on Thursday evening, at which 250 guests were present, and altogether the meeting appears to have been an important and a jolly affair.

Twenty-eight Passengers Killed on the Chicago & Grand Trunk.

A butting collision of passenger trains on the Chicago & Grand Trunk at Nichols, one mile east of Battle Creek, Mich., on the morning of Oct. 20, resulted in the death of 26 passengers, the fatal injury of two others and the serious injury of 24 others. The wreck took fire and

the bodies of all the killed were burned, many of them beyond recognition. The trains colliding were the first section of No. 6 eastbound and No. 9 westbound. Conductor Scott and Engineer Wooley took charge of No. 6 at Battle Creek, and, according to the statement of the Division Superintendent to a reporter, had had plenty of rest. Just before starting they received an order from the dispatcher reading as follows:

"Carry red signals for second section No. 6, engine 61, from Battle Creek to Durand. Meet No. 9, engine 158, on double track. Meet No. 21, engine 496, at Charlotte. All other trains due here arrived. No water at Charlotte."

The double track extended from Battle Creek to Nichols. The engineer ran out upon the single track, however, and very soon afterward met No. 9. There is a freight yard at this place, and there is a slight curve in the line, so that the engineer, at first sight of the headlight of the west-bound train, thought it was a yard engine, but he soon saw his mistake, and succeeded in nearly or quite stopping his train before the collision. No person was seriously hurt in this train. The west-bound train, however, was running at full speed, probably 40 miles an hour, and the second, third and fourth passenger cars were badly crushed. The floor of the third was pushed through the body of the fourth above the window sills, and most of the fatal injuries were in the rear of the latter car. The train had 13 passenger cars. It is said that they were old cars. The first press report stated that the fire started from the lamps, but the Detroit Free Press states, in its report made on Saturday, that "it has been ascertained that the wreck caught fire from the stove and not from the lamps."

Engineer Wooley was arrested and held for trial on a charge of manslaughter. He has made some sort of statement, which appears very lame and which other testimony seems to conclusively disprove. He does not dispute that the conductor handed him the order, and it would seem that he must have read it carelessly, if he read it at all. He says that the conductor told him that No. 9 had passed westward before he (Wooley) came on duty; but he must, of course, know better than to claim protection by any such verbal statement, when a written order was given to him. The conductor was in the baggage car when the train approached Nichols, but he did not discover that the engineer had gone beyond the end of the double track until several seconds too late. He then pulled the bell cord just as the engineer, seeing the other train, had applied the brakes. Incidentally the accounts show that the duplicate system of train orders is not in use on the Chicago & Grand Trunk, the order to No. 9 being worded differently from that sent to No. 6.

The Jackson Collision.

The coroner's inquest at Jackson, Mich., has taken a large amount of testimony concerning the collision of Oct. 13, the jury having sat four days last week; but the evidence still leaves the cause of the disaster in doubt, and the principal fact brought out is that the brakes were set on the second train before it stopped (it was necessary to bleed them to draw the cars back), thus indicating that the cock behind the tender had not been closed before the accident. Three persons at Jackson testify to having seen a tramp get off the baggage car, and two women at Ypsilanti, 47 miles east of Jackson, testify to having seen a man get upon the baggage car platform, next to the tender, as the train started from that place; but a large number at Jackson, who saw the train come in, did not see any tramp; and, as just noted, there is no evidence that the brake was tampered with. The cock in the train pipe on the rear of the tender was found closed, however, half an hour after the accident. The distance from the point of collision back to the semaphore was 470 ft.; from the semaphore back to Elm avenue, 3,330 ft., and to Jackson Junction about one mile.

Whalen's fireman, Kimling, testified that Whalen shouted to him about half a mile from the point of collision that the brakes were not going to hold. The conductor testified that he pulled the conductor's valve but that "it did not seem to work." He then went out upon the platform, saw that the semaphore was against him and went into another car and pulled the valve. He had two brakemen and a baggageman. He had run on this division six months. The train was running about 15 miles an hour when it struck the train ahead.

Whalen had been an engineer six years and during that time had been suspended twice, once for running through a split switch and once for fast running. The Division Superintendent of the road testified that he never knew of any railroad employing more than two brakemen on a train. From the testimony of a brakeman it appears that when the engineman whistles for brakes trainmen are expected to first pull the conductor's valve before applying hand brakes. This is all the evidence of consequence that we can glean from the reports.

The coroner's jury on Saturday found the railroad company guilty of gross negligence in not reducing speed to six miles an hour through the city, according to an ordinance passed in 1866. (This ordinance seems to have been a dead letter, none of the railroad witnesses knowing anything about it.) The road is also blamed for employing men who disobey the rules. This apparently refers to Whalen's neglect to reduce speed earlier, to the conductor's failure to apply the brakes

properly (he seems to have pulled the valve but not to have held it open), and to the failure of the brakeman and the baggageman to pull conductor's valves; and the engineer, conductor, baggageman and one brakeman are found guilty of neglect of duty in not operating the brakes according to rule.

The foregoing is chiefly from the Detroit Free Press. From other sources we learn that the grade approaching Jackson from the east descends at 40 ft. per mile for about seven miles. It appears that Whalen made an application of the brakes at Jackson Junction, or a short distance east of there, and that the only evidence he then had that they held was seeing the brake shoes hug the driving wheels. He at once released the brakes without knowing whether the speed was appreciably slackened. The brakes worked properly at West Detroit, Ypsilanti and at a water station about 13 miles east of Jackson. We are told further that the elapsed time would indicate an average speed of about 60 miles an hour from this water station to Jackson.

Railroad Matters in Chicago.

Freight Traffic.—The railroads had a pleasant surprise last week in the shape of an increase in their inward freight business. The surprise was all the greater as a decrease was expected. The returns show that the deliveries of grain at Chicago by 11 railroads aggregated 6,619,000 bush., as compared with 6,319,000 the corresponding period in 1892, and 4,024,000 the same week in 1891. The total of miscellaneous farm products, including flour, was 38,497 tons, and in 1892 30,332 tons. The livestock traffic was also larger than either of the preceding weeks the current month or the third week in October last year, the comparisons for the week ending Oct. 21 with last year being as follows:

	1893.	1892.
Cattle	85,419 head	19,281 head
Hogs	121,410 "	101,600 "
Sheep	84,487 "	45,303 "

The promise for a liberal grain traffic over the leading roads the week just opening is likewise good, as increased requests for cars, especially for corn, were received from country shippers the closing days of the week. In addition to the deliveries here, there is a material expansion in the movement of corn and oats from interior points across the country to Newport News, whence they go direct to foreign markets. Owing to the increase of this class of traffic the Eastern lines have been unable to supply sufficient cars to absorb the deliveries of the latter as fast as made. The result is that there is already a material accumulation of grain at junction points. As the managers of the Western railroads have on former occasions found their Eastern connections slow in returning cars, they are shy about loaning them, and the latter are now being notified that if they expect to secure much direct grain traffic from the West to the seaboard they must be more prompt with cars, that when Western cars arrive they may be unloaded without delay.

In addition to the corn movement the roads having direct lines to the wheatfields of Minnesota and the Dakotas also report a better demand for cars to market that grain. The prospects that the Atchison, Topeka & Santa Fe, Chicago, Rock Island & Pacific and Burlington lines will have a heavy cattle traffic the coming month are also good.

The Western and Southeastern coal-carrying roads, including the Chicago & Eastern Illinois, Louisville, New Albany & Chicago, Rock Island, and the Atchison report increased orders for coal cars. General Manager McDole, of the Louisville, New Albany & Chicago, said: "A number of new mines have recently been opened on the line of our road, and we are preparing to handle their output. In addition to our other facilities we are changing over 800 stone to coal cars. The cost is very moderate, and we need the cars more for coal than stone." The Chicago & Eastern Illinois is also enlarging its coal-carrying capacity in anticipation of an increased business from the mines on its line. The traffic of this line suffered severely last year, and again in the spring and summer of the current one, by strikes among the miners in the Indiana coalfields, but the present and prospective output of the mines encourages the friends of the road that the loss thus sustained will be more than made good the coming six months. Another encouraging feature for the Southeastern and Southwestern roads is the increasing lumber traffic, a freight which was almost entirely cut off during the summer and early weeks of autumn.

The following shows the amount of flour and grain delivered at Chicago by each of the railroads mentioned the week ending Oct. 21, and corresponding week in 1892:

	1893.		1892.	
	Flour.	Grain.	Flour.	Grain.
N. W.	Bbls.	Bush.	Bbls.	Bush.
Ill. Cent.	15,703	1,342,000	16,364	1,150,000
C. R. I. & P.	2,850	941,000	733,000
C. B. & Q.	8,300	845,000	7,200	888,000
C. & A. T.	13,211	1,482,000	16,961	1,625,000
C. & E. Ill.	1,650	350,000	2,850	289,000
C. & E. Ill.	300	110,000	135,000
C. M. & St. P.	15,610	668,000	13,650	543,000
Wabash.	900	220,000	2,240	129,000
C. & Gr' W.	11,573	174,000	28,031	455,000
A. T. & S. Fe.	200	463,000	325	324,000
L. N. A. & C.	19,300	24,000
Total.	70,293	6,619,000	88,121	6,295,000

The outward freight traffic was also much heavier than for the week immediately preceding, and over some lines the shipments were larger than the heavy movement the corresponding week in 1892, the increase being mainly in merchandise and mixed freight. There was, however, a liberal movement of provisions over the southwestern and southeastern roads. The Illinois Central led in the shipments to the south, while the Monon carried the bulk to the southeast. Packers and dealers in those products also predict a heavy increase in the shipments of such merchandise so soon as stocks increase sufficiently to meet the demand, which at present is much above the supply. It seems likely, however, that the outward movement of freight merchandise has reached its maximum, as the autumn trade cannot be expected to continue up to the heavy volume of recent weeks, and while the movement of coal and other heavy freight promises to be large the profits will be close, hence heavy earnings cannot be expected.

Passenger Traffic.—Officers of the Western roads, while representing the number of passengers brought to the city the past week as less than the one immediately preceding, were almost unanimous in stating that they had as many as they could handle without overcrowding coaches and increasing the risk of life and property. It was no uncommon thing for the leading roads to bring in trains in 8 to 15 sections of 10 to 15 coaches each. It was also stated that the bulk of the passengers came from a longer distance than those handled the preceding week, hence the average amount received per capita was higher; and it was thought by some that the amount of money received will equal if not exceed the receipts for the big week. The outlook for a heavy business the coming week, which closes the Fair, is also excellent, so far as regards volume, but it is acknowledged by some officers that, despite their enormous business, their net profits will be disappointingly small, and less than would have been realized had the rate of one fare for round trip, plus \$2, been maintained. In referring to present rates, the General Manager of a leading road said: "It ought to have been plain that the reduced rates would not stimulate a sufficient increase in business to compensate for the reduction, and if such had been possible the roads could not have handled the traffic without a materially increased cost of operating trains, and correspondingly greater danger. It is difficult for most people to understand the difference between doubling the number of passengers in a regular train that must run under all conditions, and putting on extras for the sake of a like increase at half price. Those who were clamorous for half rates merely to augment their business are beginning to appreciate the fact that the large profits which they pictured were extremely shadowy."

The serious accidents to passenger trains are a cause of uneasiness to every road radiating from here. The fact that the disasters on the Wabash and Illinois Central are mainly charged to extra speed for the purpose of making up lost time has induced the General Managers of a number of roads to forbid such efforts in the future. Their orders to conductors are: "If you get behind time continue so, and do not, under any circumstances, increase speed for the purpose of making up." It is complimentary to those in charge of the physical condition of the railroads that, with the possible exception of the Nameoki accident, not a single one of the late bad accidents can be attributed to imperfect track or equipment. This is the more surprising because of the enormous strain occasioned by the increased number and weight of trains which have passed over the roads within the past 60 days. These facts offer substantial proof that, while the officials of the road have practiced severe economy in some directions, they have not permitted an impairment of their property.

CHICAGO, Oct. 23.

D. D. M.

Busk-Ivanhoe Tunnel Completed.

The headings of the great Busk-Ivanhoe tunnel met on the morning of Wednesday, Oct. 18, after three years of hard labor continued day and night. The opening was made, and the workmen from each side met shortly after midnight, and the work of final clearing away and timbering went steadily on till morning. For several days previous the men wielding the pick and shovel in the great tunnel had labored under a high pressure of excitement. A description of the tunnel was published in the Railroad Gazette of Oct. 6, but a few of the most interesting facts may be repeated from that account. Work on the tunnel proper was begun on Sept. 15, 1890, and it has required some remarkable work to bore through 9,393 ft. of rock in three years. The Busk tunnel is about 12 miles west of Leadville, the eastern entrance being at Busk, on the Atlantic slope, at an elevation of 10,800 ft., and the western at Ivanhoe, on the Pacific slope, at an elevation of 10,932 ft. above the sea. The elevation at Ivanhoe is only 800 ft. above Leadville. The tunnel is 9,393 ft., or 1½ miles long, 15 ft. wide and 21 ft. high. Mr. H. Keefe, of Helena, Mont., was awarded the contract for all the work in July, 1890. He surrendered his contract after completing 8,473 ft. of the tunnel. The work has since been prosecuted under the direct charge of the officers of the Busk Tunnel Co. Mr. B. H. Bryant has been Chief Engineer and Mr. W. H. Leffingwell Resident Engineer from the start.



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EDITORIAL ANNOUNCEMENTS

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial scheme etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The actual cause of the Jackson collision is still very obscure. The fact that the brakes were on several of the cars, most of them, we believe, so hard that they had to be bled before the cars could be hauled back from the wreck, is very good evidence that the angle cock behind the tender was not closed until after the accident. That these brakes were already on would explain also why the conductor got no further response when he pulled the conductor's valve in the cars; but that the final application of brakes was not sufficient to stop the train before collision would indicate that the engineer had so reduced the air pressure, running down a long grade, to which he had come at high speed, that when the emergency came he had not enough air to get effective action. So it looks as if this poor fellow had not handled his brakes with reasonable skill and judgment, and that is all that can be said now.

In Chicago the question of steam *vrsus* electricity for elevated railroads is being discussed with much fervor. The advocates of electric locomotives are not having it all their own way by any means. They have, of course, the excellent example of the Intramural Road and the many minor advantages incident to the use of electric motors, such as non-freezing of pipes, minimum loss of heat when standing still, and decrease in dead weight of train; but on the other hand the steam locomotives are doing heavy service with excellent economy. The compounds of the Alley "L" are hauling six car trains at an average speed of 14 miles an hour between terminals with but 80 pounds of coal per train mile. The elevated road under construction in Chicago are confronted with a difficult problem. To purchase an equipment of steam locomotives and shops to repair them, in the face of a possible change to electric motors on competing lines within the next few years, is certainly unwise unless a thorough analysis of the present state of the electric locomotive art shows the probability of the failure of electricity for regular elevated service, and a very large sum of money could be saved in settlement of condemnation suits if the constructing companies could agree to use electric locomotives in the place of the more objectionable steam locomotives. All this is interesting and the outcome of the present investigations and discussions will certainly be important.

Concerning Some Recent Accidents.

Early in the year, when the discussions of the proper policy for the railroads to adopt toward the World's Fair traffic were active, we said more than once that the reasonable thing to do was not to reduce fares, not to increase train speeds nor to take any other means to greatly stimulate the passenger movement, but to order things to the end of carrying the large traffic which was sure to offer, safely, comfortably and economically. There appeared to be overwhelming reasons for this policy, and it seemed to be for the public interest as well as for the interest of the railroads

themselves. It seemed to us that the railroads were not in condition to handle a greatly increased passenger traffic; that to attempt to do so would be attended with danger, and that it would derange other traffic, and especially the freight traffic to the eventual injury of all interests; for after all the steady flow of the freight traffic is of immensely more importance to the public than any reduction of passenger fares can be or than any stimulation of passenger movement. It seems now that we are to have the sad satisfaction of saying "we told you so."

The three bad accidents of August were in no sense World's Fair accidents, but the accidents which have followed each other in alarming succession for the last two months* have obviously flowed directly from the great increase in passenger movement. All of them have been in the World's Fair passenger territory. In most of them special trains have been involved or extra sections of regular trains. All but one have been collisions, and all have carried heavy loads of passengers. All but one will, we believe, come under the classification of negligence in operation, even the one at Jackson, Mich. For a time it seemed possible that this was due to defect or failure of mechanical apparatus, but from the evidence now to hand it is apparent that it, too, came from those conditions which compelled the railroads to put freight engineers on passenger runs. So we believe it is a fair statement to say that all of these accidents have come from those derangements which follow a greatly increased passenger movement. They may be traced to long hours and hard work of all the operating staff, from the general managers to the flagmen, or to the necessity of putting men at a kind of work with which they were not familiar, or to both together.

All of this was foreseen and it is naturally asked, Why did the railroads not prepare for it? Simply because preparing for it involved more men, block signals and high condition of track, switches, rolling stock and of all the apparatus of transportation; but the financial condition of the railroads forced economy instead of greater outlay. Operating expenses had to be reduced and not increased. The special expenditures for the World's Fair business had to be limited very strictly to additional rolling stock; for the railroads the situation was complicated and particularly hard. On one side stood the press and the public demanding reduced rates, some demanding even so low a rate as one dollar from New York to Chicago, and proving that it would pay the railroads to carry passengers at any rate, and that it was their duty to do so whether it would pay them or not. On this side also was enlisted the influence of certain railroad managers anxious to stimulate a big traffic. On the other side were those men of judgment and knowledge who feared the results which have actually come. It is easy to say that they should have stood out more resolutely than they did, but the public would never have been satisfied until the matter had been carried to demonstration.

Moreover, there came in July and August a period of depression in the passenger movement; and the predictions of a great travel seemed to have failed. The bars were let down and we see the result. It discredits the railroads of the United States. Those who were most strenuous in demanding sweeping reductions in rates are now just as strenuous in demanding legislative control for the protection of passengers and are the most savage in criticising the railroad officers; and beyond all this is a great financial loss to some of the railroads and a dreadful destruction of human life. So far the lesson of these accidents seems to be that it is the duty of operating officers to stand up and fight for what they know by long and hard experience is a correct policy, and if they are overruled to let it be distinctly known that it is still against their judgment.

The lessons in the mechanics of operation as distinguished from organization and personnel are not new. The first one is the importance of block signaling; not for double track alone but for single track lines, and just here the experience of the Erie promises to be a shining example. That road has been doing a tremendous excursion business; some of its special trains have run with as many as 11 sections; it is block signaled from New York to Chicago, and we have not yet heard of a collision on it during this heavy

work. This part of the subject we consider more at length in another article.

The second important lesson of this class is that cars should be stouter and particularly in the under frames. In looking over the accounts of all these accidents the old fact appears that the passengers in the Pullman cars escaped uninjured and that the day coaches were crushed like egg shells. If a thorough overhauling of the systems of framing of day coaches as followed on many of the roads results from these recent accidents that will be at least some compensation. Every railroad manager knows that cars with very stout frames withstand severe collisions where the old light frames are crushed, and that cars with vestibules have withstood shocks which in all probability would have telescoped the cars, if they had not been thus protected, even in spite of the best ordinary buffers; but yet it is a question what to do with old cars. For new cars it pays to use strong frames regardless of any liability to collision, but in view of the record of the English roads, whose cars are all very light as compared with ours, but whose passengers ride in much greater safety, we can hardly demand that all old cars be thrown aside. But the English roads carry passengers safely in light cars because they take better precautions against collision than we do; and as long as we do not take those precautions we have no right to run light passenger cars at other than very low speeds, and have no right to run them in the same train with, and forward of, heavy cars. In a rear collision the light cars will suffer in any event, for the strong cars, if placed behind, will transmit the shock to the weaker ones in front, and the engine, still farther to the front, will act as an anvil for the blow; but in a butting collision the light cars, if placed at the rear, have only their own faults to answer for.

Another lesson from at least one of the accidents is the old one of the danger of stoves and oil lamps. How the fire was set in the accident on the Chicago & Grand Trunk we shall, it is very likely, never know. Probably it was set from more than one source; but that the kerosene lamps had a good deal to do with starting the fire is probable; that they had a great deal to do with its rapid spread is almost certain. Of course we are thoroughly familiar with the talk about the shock of a collision putting out the flames of the lamps and about the high test oil that is used, and all that, but we take it that no man of sound mind would hesitate if he had the choice between riding in a gas-lit car and a car lighted by kerosene, other things being equal.

The Block System on Railroads of Light Traffic.

The foregoing was the title of an editorial which appeared in these columns on Aug. 11. That is a recent date, and this is not a reprint of that article; but since then two butting collisions have occurred which furnish a moral, under tragic circumstances, for the arguments then presented; and we have received a communication, printed on another page, which shows that some managers still think that they have more or less good ground for sticking to the time interval system of running trains instead of adopting the radically different space interval. This communication refers to the Colehour collision. Now we have the Nichols (Battle Creek) collision, worst of all, which brings up the same questions.

The reason we "dismissed with a word" the question of adopting the block system was that we have discussed it many times in the past. The article of Aug. 11 went over the same ground that has been covered before; as, for instance, Jan. 8, 1892, and Oct. 28 of the same year. We have been publishing accounts of the introduction of the block system on single track roads ever since 1887, and it was in use to a limited extent as far back as 1885.

It is true that operators make mistakes; that on a single track a block operator has to look out for trains both ways instead of only one, and that low earnings are an obstacle to the adoption of any improvement that increases expenses. But the facilities for operating the block system are required, on single track as well as on double, for the prevention of rear collisions. This is now admitted by so many managers that we are forced to the conclusion that those who do not provide such facilities are either (1) favored with more careful trainmen than most roads, or (2) run so few trains that collisions will occur but rarely even with average men, or (3) have not the "sand" to push their directors for the additional expenditure.

The operators being provided, they can guard against butting as well as against rear collisions, but when collisions like Colehour occur, killing a dozen persons by one little mistake of a despatcher; or like Nichols,

	Killed.	Injured.
Aug. 26—Dyckerman's, N. Y.	5	11
Aug. 26—Long Island City, N. Y.	16	22
Aug. 31—Chester, Mass.	15	26
Sept. 7—Colehour, Ill.	12	10
Sept. 18—Manteno, Ill.	9	20
Sept. 22—Kingsbury, Ind.	12	20
Oct. 13—Jackson, Mich.	13	20
Oct. 16—Nameoki, Ill.	0	20
Oct. 20—Nichols, Mich.	28	21
	110	186

still worse, caused by one engineman's carelessness, we are forced to ask if protection by fixed signals and operators is not necessary for opposing trains alone. A block system maintained by station operators is a distinct addition to and improvement upon the system which trusts to the dispatcher and the trainmen to make meeting points unerringly. A station operator having just two block sections to attend to is free from liability to certain mistakes that a dispatcher is liable to. The argument that a block system weakens the trainmen's sense of responsibility is of less consequence here than when we consider double track blocking, for on single track the conductor and engineman have to keep the subject of meeting points constantly in mind for the purpose of facilitating their work, and they cannot dismiss it as being some other man's business. But whether they do or do not thus dismiss it, whether the fine spun theories are strong or otherwise, the experience of the Wabash, the Erie, the Baltimore & Ohio and numerous other roads furnishes concrete arguments for those who are not convinced by theories.

Our correspondent should note that the roads which have lap sidings and still have butting collisions are those which do not use the block system. As to poorly arranged sidings and the consequent imperfection of the block system, the answer is that even with this defect the system is better than the ordinary system.

To put on operators at all meeting points, night and day, increases the expense of operating the road; and the average state legislature will not permit a railroad to save up money in advance to provide for such an outlay, not if it can help it. The increased expense must be incurred and stock and bond holders must put up with reduced profits until business increases enough to restore the balance between income and expenses. We sympathize with the manager who labors under this disadvantage but we do not see any way for him to escape. There is not much hope of changing the attitude of the legislatures as long as there are so many roads that do not appropriate for safety appliances a fair share of the profits that they are allowed to earn. Although it is costly to provide against collisions, it is quite likely, in the long run, to be more costly to pay for the damage due to them. Furthermore, there can be no question that public sentiment will, if a way can be discovered, require the roads to provide as surely against collisions that occur only once in 10 or 20 years as against accidents likely to occur oftener. And the way will be discovered, as far as the block system is concerned; for the number of railroads giving instruction to the public by object lessons is slowly increasing.

There was no excuse for going without the block system during the World's Fair rush, on the plea that it will not be needed after the rush is over; on the contrary, it is the most elastic system that could be adopted, and it is the most effective system to provide against the possible mistakes of a lot of freight train men who are put into passenger service without sufficient training, as is now being done on many roads. The regular operators, at the stations, can block trains without going outside their regular routine, and the addition of a number of extra trains does not complicate their work. If such operators are not available for short blocks long blocks may be maintained. Even with telegraph offices 20 miles apart trains can be run each way within about an hour of each other. If offices cannot be maintained nearer together than that, it may fairly be questioned whether the road has a right to run so many passenger trains.

The Ocean Records.

The Cunarders "Campania" and "Lucania" have again lowered the records of passage between Sandy Hook (longitude 74 deg. 00 min. 09 sec., latitude 40 deg. 27 min. 42 sec.), and Daunt's Rock (longitude 8 deg. 45 min., latitude 51 deg. 30 min.). On Friday, Oct. 20, the "Lucania" beat all records for the eastward passage by making it in 5 days 13 hours and 30 minutes, which is 1 hour 25 minutes better than the eastward record of any other ship. For a few hours thereafter this steamship held five records, viz., the best maiden record, the best record for three consecutive days, the best record for five consecutive days, the best eastward record and the best westward record. Late in the same day, however, the "Campania" reached Sandy Hook, having lowered the westward record about 20 minutes, making the passage in 5 days, 13 hours and 25 minutes. The time given is the corrected or actual time required to make the passage. The difference of time between Daunt's Rock and Sandy Hook is very nearly 4 hours and 35 minutes.

The "Campania" passed Daunt's Rock
14 d. 13 hr. 35 m., Queenstown time,
and arrived at Sandy Hook

19 d. 22 hr. 25 m., standard time.

5 days 8 hr. 50 m.

add difference of time 4 hr. 35 m.

5 days 13 hr. 25 m.

The "Lucania's" daily runs eastward were 28, 480, 489, 490, 500, 490 and 348 knots, a total of 2,805 knots of 6,085 ft each. By a day is to be understood the time from local noon to the next local noon, on the ship's meridian. The "Lucania" having made the total run of 65 deg. and 15 min. longitude, equal to 4 hours and 21 minutes of time, in 5 days, 13 hours, 30 minutes, each day of 24 hours was shortened on the average by 50 minutes, and for the same rate of speed westward each day would be lengthened by the same amount. A day's run of 500 knots by the "Lucania" to eastward in latitude 47 deg. 15 min. makes a difference of 48.8 minutes in a day, or is the equivalent of 517.6 knots on the meridian, or to 535.2 knots on a westward trip. The "Campania's" daily runs westward were recorded as 456, 517, 524, 523, 533 and 233, a total of 2,786 knots; the greatest, 533, not being quite equal to the "Lucania's" 500-knot run to eastward. The "Lucania" made in one day on her last westward trip 560 knots, and the best westward day's run the "Campania" has made is 548 knots, which tends to show that the "Lucania" is the faster ship. The best daily run of the "Paris" is 530 knots westward.

The word "knot" has an uncertain meaning to landsmen, and apparently to some sailors, and these records will be best understood when converted into statute miles of 5,280 ft. The knot is variously given as follows: (See Trautwine's Pocket Book). The English knot, 6,086.44 ft.; British Admiralty, 6,080 ft.; United States Coast and Geodetic, 6,080.27 ft. But the Cunard knot is 6,085 ft.; or 1.1524 miles of 5,280 ft. The best daily runs that the several ships have made therefore are as follows: "Lucania," 560 knots westward, which is equal to 541.5 knots in 24 hours, or 22.56 knots an hour; the "Campania" westward, 548 knots a day, or 526 to 530.5 knots in 24 hours, or 21.91 to 22.10 knots an hour, depending upon whether the day's run was made at the east or west end of the passage. The best rate for one day, then, made by these ships is, when expressed in statute miles per hour, "Lucania," 26.00 miles; "Campania," 25.26 to 25.46 miles.

The best average rates per hour for the whole passage are: "Campania," in June, when she made 2,804 knots in 5 days, 15 hours, 37 minutes, or 21.12 knots an hour, or 24.34 miles an hour; "Lucania," on her recent eastward trip, 2,805 knots in 5 days, 13 hours, 30 minutes, or 21.01 knots an hour, or 24.21 miles. The best hourly average rate of the "Paris" for a passage is 20.70 knots or 23.85 miles.

The distance sailed by these steamships varies from 2,563 to 2,864 knots, but the most direct route computed is very nearly 2,526 knots, which would indicate that the steamships travel from 1.3 per cent. to 13 per cent. further than is absolutely required. This is to avoid collisions and icebergs. The westward route, as prescribed to sailing masters by the company, is much shorter than the eastward, and it is shorter from July to January than from January to July, which may account for the better records made in the autumn than in spring and summer. The distances over the routes are given as follows:

	EASTWARD.
Jan. 15 to July 14.....	2,843
July 15 to Jan. 14.....	2,756
	WESTWARD.
Jan. 15 to July 14.....	2,653
July 15 to Jan. 14.....	2,563

The two ships are identical in every respect, or at least so far as an ordinary observer could ascertain. The engines are from the same patterns and the hulls built on the same lines. The parts are so nearly alike that they may be interchanged as has already been demonstrated. The company is experimenting by interchanging the screws and adopting propellers of different pitch, so that really the highest speed or efficiency is probably not yet attained.

A brief description and the dimensions of these ships were given in the *Railroad Gazette*, Feb. 10, 1893, and *The Engineer* of Oct. 13, 1893, gives 16 pages, and *Engineering* of April 21, 1893, devotes 75 pages to the description and illustration of these ships.

The Lackawanna Situation.

It has been known for several months that there has been a quiet and steady buying of Lackawanna. This was supposed to have been in the interests of the Jersey Central syndicate of capitalists, otherwise known as the "First National Bank crowd." They were known to be largely interested in Lackawanna. This gave color to the theory that they were seeking the control. It transpires, however, that while they may have bought some stock and are generally believed to have purchased the Rockefeller's holdings of 18,000 shares, the buying was for another account. It became known on Monday, after Lackawanna had advanced 11 points, that there had been transferred to the name of Mr. Wm. K. Vanderbilt 40,000 shares of Lackawanna.

The share capital of the Lackawanna is \$26,200,000 in 524,000 shares of \$50 each. Besides the Vanderbilt holding, Mr. J. Rogers Maxwell, President of the Central of New Jersey, and others in harmony with him are large owners, and it is supposed that these large holdings will work together and control hereafter the policy of the road. Of course, however, that is merely a matter of conjecture. Those who have lately bought Lackawanna in such large lots may have done so simply as a profitable investment, for the price has apparently not been high. In 1892 the highest quotation

was 167½ and the lowest 138½. In August of this year it stood at 141 and 131½, in September at 150 and 135½, and in October it touched 146½ on the 6th and 158 on the 20th. On the 23d it opened at 161, sold up to 171½, and closed at 168 bid and 170 asked, the transfers on that day having been but 5,622 shares. When the Vanderbilt purchases were made does not appear, but presumably they were made at pretty low figures. Mr. Vanderbilt's brokers say that they began two or three months ago. The traffic results will probably be important. The stocks of the coal roads went up at once on the supposition that the principal coal carriers will now work together, and it is conjectured that the western connection of the Lackawanna will be over the Vanderbilt lines instead of over the Grand Trunk, which has had a traffic contract with the road. Speculative persons even see in this movement a change in the ownership of the Toledo, Ann Arbor & Northern, and it is said that Lake Shore officers have lately shown a great deal of interest in that property.

It is generally conceded that Lackawanna has been for a number of years the thorn in the flesh of the coal trade. Its attitude has been independent and aggressive as far as its operations are concerned, while at the same time it has advocated at sales agents' meetings harmony and a maintenance of coal prices. The results of this line of policy were shown at the close of last year, when it was demonstrated that the road had increased its output several hundred thousand tons over its allotment. The nature of the coal trade is such that when a powerful factor shows bad faith its competitors are either forced to suffer in consequence or to engage in a wholesale and disastrous war. All of last year competitive companies suffered, while Lackawanna secured the cream of the business.

The policy of Jersey Central in the coal trade is well known. It is a peacable one, which has mostly worked for harmony and stability. The fact that it will co-operate with the Vanderbilt interest is considered as evidence that Lackawanna will be controlled in the interests of peace. The Vanderbilts have large holdings in Delaware & Hudson, and have three representatives in that company's directory. With the three companies, namely, Lackawanna, heretofore the disturbing element, Jersey Central and Delaware & Hudson in the control of one syndicate, an element of stability will be imparted to the trade, such as it has never heretofore had.

The position of Reading in the coal field at this writing is problematical, and has been the subject of much speculation in the financial world since Monday. On one hand it is thought that the controlling interests of the trade will attempt to strip Reading. On the other hand it is reasoned that the Vanderbilts never do things by halves, and they recognize that a company which owns 50 per cent. of the anthracite coal lands of the country will, some day, be a controlling factor. They have invested vast sums of money in the coal stocks, and absolute security can be had only through Reading control. It is not logical to assume that Reading can be stripped without the consent of the management, and if such management is in the interest of those who are seeking to destroy the property it could not long stand the opposition of the majority. If the majority controls the property it manifestly would not seek its destruction. If Reading should be left out in the cold it would very naturally become an independent factor, similar to the Lackawanna of old, and thus would the present work for stability be undone.

Finally, and perhaps most important, it is hoped that the Trunk Line Association has eliminated one of its most unruly members.

The foundations for the piers of that part of the Lake Street Elevated Railroad, Chicago, between the river and Rockwell street were built at the curb line, but from Rockwell street west the foundations are in the street, and, as has been recently found, directly over water mains, from 12 to 16 in. in diameter, and a large gas pipe. The railroad officers claim that the location of the foundations where they are is entirely the fault of those who were in the City Engineer's office when the foundations were being built. When it was found that the foundations were directly over the water and gas mains, permission was asked of the City Engineer to locate the foundations on a different line or to have the mains moved at the expense of the railroad. It is claimed that the City Engineer would permit neither and that the only course for the railroad was to locate the piers as they are, over the pipes, and meet the objections to such location later. The first mishap occurred last week when a locomotive was run for the first time over the portion of the structure west of Rockwell street; the weight of the engine broke the water main in one place, and the water rushing from the pipe threatened a number of the foundations. It was thought at first that the pipes might carry the weight of trains, but this accident was positive proof to the contrary, and indicated what might be expected at intervals if the piers remained over the water mains. The city will now lay a new water main between the line of foundations and the curb, and the railroad company will pay the expense. The water will be turned into the new main, but it appears that the old main will not be removed. Whenever the pipe breaks under a foundation the structure will be tem-

porarily supported until the repairs are made. An effort will be made to have the new pipe in place by Oct. 28, the date set for opening the line between California avenue and Market street. The latter is the eastern terminus of the road. The City Engineer's department claims that the blunder of placing the piers over the water main was made by the officers of the railroad; that the ordinance of the company fixed the position of the line on the street; that the permit was given on the ordinance, and that it was not the duty of the city to point out what underground work might be in the way of the plan.

The Youngstown Bridge Company, through its Chief Engineer, Mr. C. E. Fowler, has undertaken a good but difficult piece of work in the preparation and publication of general specifications for buildings. Very good specifications have been published for general bridge work in iron and steel, of which Clarke's, Cooper's, Bouscaren's, Thacher's and Whittemore's are most familiar. This is, we believe, the first attempt at a general specification for architectural construction. It is very well adapted to mills and warehouses, for which it seems to have been designed. The loadings for snow, wind and covering are usual, as are the unit stresses for iron and steel. The straight line formula for compression members is that recommended by Mr. Thacher with the coefficient changed to use l in feet. The specifications for details, workmanship, materials and erection strike one as being too general to satisfy an exacting architect or inspector. They will probably be drawn closer and be made more in detail when applied to different styles of structures. The attempt to draw general specifications for buildings is certainly courageous, the structures vary so much in character and in the purposes for which they are designed. Probably it will be necessary to draft several forms to meet the demands of different structures; but the specifications of the Youngstown company fulfill every reasonable expectation, and will do much to assist architects and to insure the reasonably safe and proper construction of iron buildings.

The disposal of the World's Fair buildings is yet unsettled. No bids have been received that have appeared, in the minds of the officers, to be reasonable in amount or conditions. The various committees appointed to take up the matter are having almost daily meetings with the Park Commissioners and hope to influence the Commissioners to grant an extension of time for the removal of the buildings. The Park Commissioners fail to find any source from which they can draw money enough to keep the buildings in repair and therefore have been compelled to decline acceptance of some of the buildings that would under other conditions be desirable for the beginning of museums. The Fair will be kept open some time after Nov. 1, and an admission fee will be charged, but the official closing will take place Oct. 31, and exhibitors will be permitted to withdraw their exhibit any time after that date. The Concessions in the Midway Plaisance and elsewhere will be permitted to run their shows and charge admission as long as the Fair grounds are open to the public. An estimate of the total attendance up to Nov. 1 is 22,000,000.

The need of ventilating the conduits used for electric wires in cities is emphasized by the practical experience in the city of Chicago. Every few days there is an explosion of gas and air in the conduits which blows the large manhole covers off their seats sometimes to a considerable height, which frightens horses and endangers the lives of the citizens. The gases which form the explosive mixture in the conduits come from the leakage of the gas mains. The ignition is caused by the short-circuiting of the wires in the conduits brought about by water or breakage of insulation. Better ventilation of the conduits is probably the only remedy.

The Mexican Central is fitting all of its engines to burn wood. Some of them have been using wood, but the discount on silver is now so heavy that it is cheaper to burn wood than coal, and all the engines will be arranged to that end. Mr. Johnstone, the Superintendent of Motive Power, has designed a boiler and firebox for burning wood for his compound locomotives, and the new locomotives to be ordered will have the new boiler and the Johnstone compound cylinders.

NEW PUBLICATIONS.

The Theory and Practice of Modern Framed Structures. By J. B. Johnson, C. E., Professor of Civil Engineering, Washington University; C. M. Bryan, C. E., Engineer Edge Moor Bridge Works, and F. E. Turneaure, C. E., Professor of Bridge and Hydraulic Engineering, University of Wisconsin, New York: John Wiley & Sons, 1893. Pages 528. Numerous illustrations in the text, and folding plates and alphabetical index. Price, \$10.

The authors in their preface say that this seems to be a fit time for the presentation of a general treatise on modern framed structures. The evolution of methods of analysis and construction has heretofore been so rapid that no sooner does a work on structures appear than it is found to be behind current practice, but they believe that this rapid evolution has now about run its course,

and therefore they felt that the time had come to write the book which they now put forth.

It is designed to be something of a compendium, a textbook and a designer's handbook. As a compendium it is intended to cover a good deal of the ground found in works on mathematics and mechanics without too much detail. As a textbook it is intended to serve as a handbook on framed structures for the student who has finished his course in mathematics and mechanics. As a designer's handbook it is intended to contain such ready information as any competent designer must constantly use. The authors say further that the book has been written by so many persons that it is only in a limited sense that those whose names appear on the title page may be considered as its authors. They give a list of the authors of various chapters and appendices, from which we find that besides the three gentlemen whose names appear as authors, there are chapters or parts of chapters by seven others, including Mr. J. W. Schaub, formerly Chief Engineer of the Dominion Bridge Co. and the Detroit Bridge Co., now General Manager of the Pottsville Bridge Works; Mr. D. A. Mollitor, who has written a chapter on the Esthetic Design of Bridges, and Mr. C. T. Purdy, who writes on Iron and Steel Tall Building Construction from the standpoint of an actual designer of many large buildings.

The cuts and plates have nearly all been especially drawn for the book and engraved by the American Bank Note Co., and they are very satisfactory indeed. In fact, the book is excellently printed, the running headings, chapter and subtitles and sideheads indicating subdivisions of topics all being very clear, making it handy to use the book.

The title of the work—"Theory and Practice of Modern Framed Structures"—indicates that it should cover the field of bridge design and construction thoroughly, and that it should also include all framed structures. As a matter of fact, besides bridges proper, the work treats of timber and iron trestles and elevated railroads, standpipes and elevated tanks, iron and steel tall building construction, iron and steel mill building construction, with appendices on structural steel and general specifications; processes in the manufacture and inspection of iron and steel structures, and American methods of erection of bridges and structures. A chapter on lock gates, which was included in the original scheme, was made unnecessary by the excellent monograph by Lieutenant Hodges, U. S. A., published in the professional papers of the Corps of Engineers.

Altogether the book seems to us an admirable one in plan as well as in treatment. The history of the designs and theories treated is given at sufficient length to interest and inform the reader. The theory of the various subjects is sufficiently elaborated; and the second part of the work, on designing and detail, is especially full, with many excellent illustrations of unusual and usual designs.

Continuous Current Dynamos and Motors: Their Theory, Designing and Testing; an Elementary Treatise. By Frank P. Cox, B. S. New York: W. J. Johnston Co., Limited, 1893. Pages 272, 12mo, with illustrations and index. Price, \$2.

The purpose of this book is to give to students theory and designing as understood and practiced in the designing-room, and methods of testing as actually followed in the shop. It has been the aim of the author to keep the practical side in view. The first four chapters review briefly electrical units and the general principles of the machines. The chapters that follow give methods of calculation pertaining to the magnetic circuit, the theory of windings, designs of armatures, magnets and motors, the efficiency of the dynamo as a motor and methods of testing. There are two chapters on the induction and calculation of the efficiency of steam engines.

TECHNICAL.

Manufacturing and Business.

The Falls Hollow Staybolt Company, at Cuyahoga Falls, O., resumed operation on Oct. 1, after a shutdown of three weeks for repairs and improvements, which have materially increased the capacity of the works. This company is one of the few reporting an increased demand and plenty of work.

The Northwestern Malleable Iron Works, at Milwaukee, Wis., has resumed with a full force. It is understood that the works have a number of large orders on hand.

At a meeting of the board of the Guarantee Company of North America, held Oct. 16 at Montreal, Can., Mr. Edward Rawlings was unanimously elected to the presidency of the company, vacant since the death of the late Sir Alexander T. Galt; Mr. W. J. Withall was elected Vice-President, and Mr. John Cassils was elected to fill the vacant directorship. The Board is now composed as follows: President and Managing Director, Edward Rawlings; Vice-President, W. J. Withall, Vice-President Quebec Bank; E. S. Clouston, General Manager, Bank of Montreal; G. Hague, General Manager, Merchants' Bank of Canada; W. Wainwright, Assistant General Manager, Grand Trunk Railway; T. G. Shaughnessy, Vice-President, Canadian Pacific; Hartland S. MacDougall, Stock Broker and Financial Agent; John Cassils, Treasurer Dominion Express Co., and E. C. Smith, President Central Vermont Railroad.

The Lodge & Davis Machine Tool Co. of Cincinnati, O., has just received a large order from the Cleveland, Cincinnati, Chicago & St. Louis for lathes and other tools to be used in the new shops of that company now in course of construction at Bellefontaine, O.

The Stow Manufacturing Co., of Binghamton, N. Y., manufacturers of the Stow flexible shaft, reports that its trade, up to Oct. 1, shows quite an increase over that of the corresponding months of 1892, but its expectation of doubling the amount of its business of 1892, of which there was a good prospect early in the year, will hardly be realized. During the past two months the company has greatly improved its plant, adding largely to the boiler capacity, etc. A decided improvement in the October sales over those of the preceding month is noticed.

The Granite Railroad Signal Co. has been recently incorporated to succeed to the business of the Cannon Granite Torpedo Co. The officers are John N. Shepard, President; W. H. Brown, Secretary, and John G. Bennett, Treasurer. The principal offices are at 447 Wood street, Pittsburgh. The company will manufacture railroad torpedoes of every variety; red fire time danger signals, a patent torpedo adjuster and similar devices.

The Hancock Inspirator Co., of Boston, has received the medal and the highest award for its locomotive inspirators exhibited at the World's Fair.

It is said that steel tubes about the size of a human hair, the hole in which can only be seen with a powerful glass, have recently been drawn by the Ellwood Ivins Tube Co., of Philadelphia.

The Drexel Railway Supply Mfg. Co., of Chicago, has filed a charter in Illinois, naming W. A. Alexander, D. W. McCord, and A. C. McCord as incorporators. This company manufactures the Barr vestibule, Drexel coupler, Drexel truck, etc.

The United States Mfg. & Supply Co., of Charleston, W. Va., has been organized to manufacture and deal in railroad supplies. The capital stock is \$200,000, and the incorporators are G. Taylor Simonton, Orlando Gibson, M. M. McNeill, H. C. Madden and Thomas S. Johnson, all of Huntingdon, Pa.

The Lambert & Bishop Barb Wire Mill, a branch of the Consolidated Steel & Wire Company, have put 150 more men at work on the night turn in the nail mills, while other smaller industries of Joliet are increasing their forces of workmen.

The judges at the World's Fair have made awards to the Joseph Dixon Crucible Co., Jersey City, N. J., for superior products in graphite, lead pencils, plumbago, crucibles, black-lead stoppers and nozzles, dippers, bowls, foundry facings and lubricating graphite.

The annual election of directors of the Madison Car Company was held last week. There were three vacancies, caused by the expiration of the terms of office of C. D. McClure, E. S. Rowse and L. M. Rumsey, who were re-elected. Reports have been printed that the Pullman Car Co. had offered to operate the plant under lease. What foundation there may be for this story does not appear. The property is now operated by a receiver.

The force at the Elmira Bridge Works is working full time, day and night, to catch up with orders. The bridge and construction department of the Pennsylvania Steel Works is also very busy on bridgework.

The Ohio Falls Car Co., of Jeffersonville, Ind., has declared a dividend of two per cent. on its preferred stock.

The Schultz Bridge & Iron Co., of Chartiers, Pa., has its plant running on full time, having enough orders on hand to keep it busy for some time.

Iron and Steel.

The Baltimore & Ohio has placed an order with the Carnegie Steel Co. for 500 tons of 85-lb. steel rails for its Pittsburg Division.

The Illinois Steel Company now expects to start the converters and billet mills of its Joliet works about Nov. 1, employing about 1,000 men. An increasing demand for its products is reported, though prices remain low.

New Stations and Shops.

The Berlin Iron Bridge Co., of East Berlin, Conn., has a contract to build an iron roof for a sugar-house at Tampa, Fla. The building will be 60 ft. in width and 125 ft. in length, the trusses being entirely of iron, covered with corrugated iron.

The West Virginia Central & Pittsburgh will soon begin the work of removing the present passenger and freight station at Elkins, W. Va., and will erect on the site a modern passenger station. The old combination station will be rebuilt elsewhere in the town and used as a freight station.

The Pennsylvania is erecting a station and warehouse at Juniata, the new railroad town, near Altoona.

Riehlé Bros. Testing Machine Co.

Riehlé Bros. Testing Machine Co., of Philadelphia, Pa., have in Machinery Hall a very extensive and interesting display of the testing machines for which they are celebrated.

Among the exhibits are a 300,000-lb. vertical screw power testing machine with patented electric automatic screw beam; a 200,000-lb. and a 100,000-lb. screw power testing machine; a 200,000-lb. horizontal car coupler

testing machine arranged for links, pins and brake beams; an 80,000-lb. spring testing machine; a 20,000-lb. vertical screw power testing machine with vernier poise; a 5,000-lb. and a 3,000-lb. transverse testing machine with indicator; a 5,000-lb. torsional testing machine, and a 1,000-lb. cement tester with worm gear and rubber grips similar in style to those in use by the U. S. government.

There are also cloth and twine testing machines and their latest improved marble holding and counter sinking machines.

In the Government Building in the U. S. government exhibit are also some Riehlé testing machines loaned by the government for the occasion. In this exhibit some of their frictionless ball-bearing screw jacks are found.

Pintsch Gas on Street Cars.

As we noted two or three weeks ago, the North Chicago Street Railway Company has commenced the substitution of Pintsch gas for the oil lamps now in use on their cars. The company has built a plant for the manufacture of gas on Larrabee street. Two hundred cars will be fitted up and the system carefully tried before ordering further equipment. Two four-burner lamps will be placed in each car.

Bristol Manufacturing Co.

A very interesting and attractive exhibit in Machinery Hall is that of the Bristol Manufacturing Co., of Waterbury, Conn. This company makes a specialty of recording pressure gages and belt lacings. Their exhibit of gauges is especially fine and embraces a list of over twenty different ranges, from vacuum to 1,500 lbs. per sq. in., and adapted to record continuously pressures of air, gas, steam, water and other liquids. Models of the different recording instruments are placed on tables so as to be convenient for the inspection of visitors. There is a low pressure gage by which visitors may test their lung power, it recording up to 10 lbs., and being provided with a mouthpiece through which to blow. To exhibit the high pressure gages there is a hand screw pump provided. A new recording thermometer is also shown, but which has not yet been put on the market. One of the latest inventions exhibited is a recording voltmeter which has the same outward appearance as the recording pressure gage. This may be used for both direct and alternating currents and has been in service in several large electric light plants, giving universal satisfaction. Two of these instruments, one a direct and one an alternator, have been used by the Committee on Awards in connection with the life tests of incandescent lamps.

Another feature of the exhibit is the steel belt lacing. It is claimed that this lacing has been given very severe tests, which it has stood most exceptionally. Ten different sizes are exhibited, the largest being made of $\frac{1}{2}$ -in. cold rolled steel.

New York & New Jersey Bridge.

Last week a bill passed the United States House of Representatives giving a congressional charter to the New York & New Jersey Bridge companies incorporated in those two states. It is provided that the location shall be subject to the approval of the Secretary of War, and that it shall not be below Sixty-sixth street; it is provided further that in case of dispute as to the terms on which railroad companies are allowed to use the bridge, it shall be submitted to, and decided by, the Interstate Commerce Commission. The location of approaches in the city of New York shall be approved by the Commissioners of the Sinking Fund. The stipulated clear headway for vessels is 150 ft.; no piers shall be built on the New York side outside of the pier head lines, and none on the New Jersey side except at such a point as will allow a clear waterway of not less than 2,000 ft. from the New York pier; but the Secretary of War may require a still wider channel. The company must submit to the Secretary of War, within one year after the passage of the act, its plans, and construction must begin within one year after the plans have been approved, and within two years after the passage of the act; and in the first year at least \$250,000 must be spent and in each succeeding year not less than \$100,000 in actual construction work, and the bridge must be completed within 10 years.

New Locomotives for the Paris, Lyons & Mediterranean.

The new locomotives of the Paris, Lyons & Mediterranean Railroad, designed to haul express trains at 50 miles an hour, are to have larger grates, fireboxes and heating surface altogether than has been the practice heretofore on that railroad, and are to carry heavy boiler pressures, namely, 15 k. per sq. cent. ($= 213.3$ lbs. per sq. in.). As we have said before, they are four-cylinder compounds. The Servo ribbed boiler tube is used and the total heating surface is 148 sq. meters (1,592.5 sq. ft.) as compared with 120 (1,291.2 sq. ft.) in the former standards. The diameter of the boiler has been increased about six centimeters. The high pressure cylinders have a diameter of 34 centimeters (13.4 in.) and the low pressure 54 (21.3 in.). The former are inside and turn the forward driving axle. The low-pressure cylinders are outside, arranged similarly to those of the express locomotives of the Southern Railroad of France and are connected to the rear axle, which is back of the firebox. The drivers are coupled and have the standard diameter, two meters. These engines have four-wheeled swinging trucks. It is calculated that the increase of

power in these engines over the express locomotive of the same company exhibited at Paris in 1889 will be about 20 per cent. Nevertheless, the new locomotive is a little lighter, the total weight being 48 metric tons in place of 53.5. The adhesion weight will be a little over 30 tons and each axle of the swinging truck will carry somewhat less than nine tons. The first two of these engines were tried last May between Paris and Dijon, making 314 kilometers in four hours with a stop of five minutes. If this speed is maintained for the whole journey between Paris and Marseilles, 863 kilometers, it will be made in 11 hours, whereas the present expresses take 14 hours and 30 minutes and 14 hours and 30 minutes.

Gas Engines for Street Car Propulsion.

Gas engines for street car propulsion have lately been experimented with in Switzerland and in Germany. At Neuchâtel an 8-H. P. double cylinder motor car has been in use for some time. The car seats about 20 passengers and hauls a trailer, the speed maintained being about $6\frac{1}{4}$ miles an hour. The gas for the engine is carried in tanks under pressure of about 150 lbs. per square inch. The local street railroad company has ordered a number of such gas motor cars for regular use, and has made arrangements also with the gas company of the town for the supply of gas.

At Dresden a somewhat similar motor car, equipped with two gas engines of 7 H. P. each, is in use. Both engines are coupled to one shaft, from which power is transmitted to the axles by a friction clutch arrangement. The car carries four gas tanks charged to a pressure of about 90 lbs. per square inch. Starting and stopping is said to be accomplished without difficulty, even on five per cent. grades. At still another town, Nordhausen, gas engines are also to be tried for street car service, preparations now being made to fit up a short experimental line.

The Barton Bridge.

The old aqueduct bridge built by Brindley and finished in July, 1761, which carried the Duke of Bridgewater's canal over the Irwell and was probably the first bridge carrying one navigation over another, is now replaced by a swing aqueduct over the Manchester Ship Canal, and is being torn down. Lord Egerton, of Tatton, the Chairman of the Manchester Ship Canal Company, in referring to the demolition, said that the story was told of Brindley that another engineer was called in and consulted as to the scheme, and the person consulted (possibly Smeaton) characterized the plan of the Barton aqueduct and embankment as instinct with recklessness and folly; and, after expressing his unqualified opinion as to the impracticability of executing the design, concluded his report to the Duke of Bridgewater thus: "I have often heard of castles in the air, but never before saw where any of them were to be erected." There is another story of the same bridge tending to show that Brindley himself was not entirely certain about the stability of his work, for it is said that the day the canal trunk was filled with water Brindley went to bed and did not get up until he was told that a boat had passed in safety.

Experimental Locomotives for the St. Gotthard Railroad.

Two experimental locomotives for the St. Gotthard Railroad are at present being built by the Swiss Locomotive & Machine Works, at Winterthur. They are to be used for hauling the heavy fast trains on that road between Luzerne and Chiasso, on which section there are some heavy grades, and are to do away in part with the prevailing system of doubling up engines, besides shortening the running time.

The engines are designed to run at a maximum speed of about 50 miles an hour. Each will have three coupled axles sustaining equal weights of 15 tons, and a two-axle radial truck. The tenders will have three axles each. With a boiler pressure of 210 lbs. per square inch it is expected that the engines will haul a 250-ton train up a 10 per cent. grade at a rate of speed of $33\frac{1}{2}$ miles an hour, and a 140-ton train up a 26 per cent. grade at a rate of about 25 miles an hour. The total weight of each locomotive in running order will be 95 tons. One of the engines will be of the three-cylinder, compound type, and will be worked as a compound on the comparatively level sections, while on the mountain sections all three cylinders will take steam direct from the boiler. The other engine will be a four-cylinder compound, and arrangements will in this one also be made to enable all four cylinders to work with steam direct from the boiler, if necessary. That one of the two engines which give the better performance will be taken as the type of a number of others to be subsequently built.

An account of the Mallet duplex compound locomotives for the St. Gotthard will be found in the *Railroad Gazette* of May 5, 1893.

Continuous Brakes in India.

On the East Indian Railway 35 passenger vehicles have been fitted for the continuous automatic vacuum brake, 11 with brake gear complete and 24 with pipes. On the Indian Midland authority has been given to equip 16 vehicles and on the Northwestern 490 vehicles and 70 engines were fitted with automatic vacuum brake apparatus and 47 piped during the year 1892. On the Oudh & Rohilkund the automatic vacuum was fitted to the stock running in the mail service in 1892. On the Eastern Bengal at the close of 1892 10 engines and 108 vehicles had been fitted up. On the Great Indian Pen-

insular the number was not increased during the year, the total standing now at 66 locomotives and 159 vehicles. The Madras Railway has ordered automatic vacuum brake gear complete for six coaches and piping for seven. On the South Indian Railway the new stock, consisting of 20 engines and 100 cars, is fitted with the automatic vacuum. The Bombay, Baroda & Central India has 45 engines and 450 vehicles fitted with the simple vacuum, but material has been received for converting this into the automatic. On the Southern Mahatta no automatic vacuum brakes have been put on, but 3 locomotives and 10 coaches have been fitted with the Westinghouse. The Westinghouse does not seem to advance much in India.

The North Sea Baltic Canal.

This great work is fast nearing completion, the engineers saying that it will be opened without fail next year. It is a sectional cutting, there being no locks or sluices along the course, but at each end there is a double set of gates regulating the water level in the canal. The average level will be the same as that of the Baltic. The bed of the canal is 9 fathoms below normal water level, and it has a bottom width of 22 yards. The side slopes are one to two and one to three. The depth of water at the lowest tide will be 6.17 yards. The Baltic trading steamers which generally draw no more than 18 ft., and do not exceed a 36-ft. beam will be able to navigate the canal and pass each other. There are a few curves with a radius of a thousand yards—these are the sharpest; and 63 per cent. of the line is straight. During the summer some 5,000 men have been at work on the canal, and up to the present time about 80 million cubic meters of excavation has been completed at a cost of about £3,500,000 sterling. The entire cost of the canal is estimated at £7,800,000, of which Prussia contributes £2,500,000 and the Empire the balance. These details are taken from *The Engineer* of Oct. 6, where may be found a paper of some length on the canal.

Pintsch Gas in India.

The government has sanctioned an estimate for lighting 180 passenger vehicles on the East Indian Railway, and works for making and compressing gas are well advanced. On the Oudh & Rohilkund the government has approved of fitting 57 passenger vehicles. The experiments on the Madras Railway having been satisfactory, an order has gone forward for sanction for a complete set of gas making and compressing apparatus, together with mail equipment, for introducing its system on most of the company's passenger vehicles. An order has been sent forward also for the apparatus for manufacturing and supplying Pintsch gas on the South Indian Railway, 100 passenger vehicles to be fitted up at once and the remainder of the rolling stock next year. These orders are in addition to those reported in our issue of the 20th.

Road Engineering and Construction.*

The argument in this address was opened by a statement of the total tonnage of the railroads in the United States in 1891, and on the great lakes. The fact was brought out that a very large percentage of the tonnage moved by rail or water must first traverse the common road over which the resistances as measured by the cost of movement are 22 times greater than by rail, and 266 times greater than on the ocean—that the earth roads could be very greatly improved at comparatively small expense, and that the resulting benefits would be general, affecting all classes of the community and all other systems of transportation.

The engineering question as relating to roads was shown to require the same skill and technical knowledge as for railroads, and was considered under the four subdivisions of location, construction, operation and maintenance.

The author closed his paper by the general statement that "while the rapid progress made by the United States since 1830 was due largely to the instrumentality of her railroads, the greatness of Britain was attributable mainly to her foreign commerce, in which she utilized the cheapest known methods of transportation; while the thrift, frugality and wonderful recuperative powers of both France and Germany were due chiefly to their good roads and numerous internal waterways." Our people, as a whole, need to be impressed with the importance of securing cheaper transportation, and be made to realize that our common roads are a most serious obstruction to our otherwise phenomenal growth.

New Bids on Chicago Drainage Canal.

The contract for excavating Sections 2, 3 and 4 of the Chicago drainage canal was originally let to McArthur Bros., of Chicago. The contractors built three or four miles of railroad, cleared and grubbed the sections and built large levees along them preparatory to the excavating. Nothing has yet been paid for this work. In making the excavations the contractors found, as they claimed, that much of the material to be removed did not agree with the engineer's classification of it, and that instead of being reimbursed for removing glacial drift at the rate of 50 to 60 cents a cubic yard, they should receive compensation at the rate agreed upon for removing solid rock, about 80 cents a cubic yard. On account of the disagreement between the contractors and the engineer to the

* Abstract of paper, by Prof. Lewis M. Haupt, read at the Road Congress Auxiliary of the World's Fair, Chicago, Oct. 16-30, 1893.

Drainage Board over the classification of the excavations made, and to be made, the Board canceled the contract with McArthur Bros. New specifications were drawn for the three sections and bids asked. A few of the bids have been received and opened, but the contracts have not been relet. It is stated on good authority that the material met with on these three sections, and over which the dispute has arisen, is a blue clay, partly dried, and interlaid with stone much resembling crushed stone. In such material a steam shovel cannot be used, as the stones with the hard clay backing twist and break the fingers of the scoop, making repairs very frequent and expensive. It seems to be on this account that McArthur Bros. thought the material should be classed as solid rock and the compensation be in accordance with such classification.

The Serve Tubes Again.

The "Berlin" of the American line arrived at New York on Oct. 23 from Southampton, after a passage of 8 days 7 hours and 34 minutes, having beaten her own best previous time from Southampton by five hours. Certain changes have been made in the power of the vessel since the port of departure was changed from Liverpool to Southampton. The boilers of the ship have been fitted with the Serve ribbed tube, and the Ellis & Eaves combination induced (or suction) draft has been put in. Mr. C. W. Whitney, of New York, the United States agent of these devices, regards the increased speed which the ship has shown as considerably due to these changes.

Abrasives.

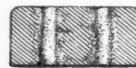
The Tanite Co., of Stroudsburg, Pa., undertook as its contribution to the World's Fair to treat the subject of abrasives from an educational standpoint. The collection which the company made was got together with that principle in view, and will be presented to the Smithsonian or the Chicago University, or some other suitable institution. The articles shown in the exhibit were furnished not only by the Tanite Co., but by various other liberal minded manufacturers. Emery is illustrated very fully, ore being shown from Turkey, Greece and the United States. It is then shown in its successive stages up to whetstones and emery wheels. Tables are exhibited showing the comparative efficiency of the emery wheel, the file and the cold chisel. Corundum is shown, as also are samples of pumice stone and rotten stone, India spar, chilled iron shot and various other abrasive materials and devices.

Wooden Plugs for Spike Holes in Ties.

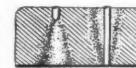
On some of the French railroads the spike holes in ties are filled with plugs of oak or creosoted pine. These plugs used to be manufactured by hand, but were naturally ill-fitting. A simple machine for cutting these plugs has been invented by Albert Collet. It was exhibited first at the Paris Exposition of 1889, and has since been in successful operation. On a single railroad more than a million and a half of the plugs have been used. Their price is \$1.80 per 1,000. They are cut in pyramidal shape, with square or octagonal section, out of the best parts of old ties. The illustrations give sections through ties, where the spike holes are not plugged, or badly plugged or well plugged, and show how the



Well Plugged.



Not Plugged.



Badly Plugged.

timber rots around the holes which are not filled or incompletely filled. The use of plugs prolongs the life of ties by several years.

THE SCRAP HEAP.

Notes.

The Louisville & Nashville was reopened for through trains between Mobile and New Orleans on Oct. 17.

Monday last was "Union Pacific Day" at the World's Fair, and, according to a Western paper, people traveling to Chicago on the trains of that road were supplied with blue satin badges to indicate where they hailed from.

Mr. Theodore Fry recently traveled from Queenstown, Ireland, to Chicago, in 6 days and 10 hours. He came on the steamship "Lucania," arrived in New York in the morning, and started for Chicago on the Exposition Flyer at 3 o'clock the same day.

Five million dollars in gold, from San Francisco for the United States sub-treasury, was delivered in New York Aug. 19, by Wells, Fargo & Co. The newspapers did not hear of this shipment until it arrived, and even then they could not find out what road it came by.

The order of the New York, New Haven & Hartford that heads of departments must not retain their relatives in employment seems to have been issued throughout the system. A few weeks ago we noted its issue on one of the divisions terminating in Boston, and now it is reported as causing the dismissal of several men from the shops at New Haven.

The Chicago & Southeastern, formerly the Midland of Indiana, which extends from Anderson, Ind., westward to Waveland, 68 miles, is reported to be practically closed by a strike of the employees, who have not been

paid for some time. The road is chiefly a freight line, and no time-table appears for it in the *Official Guide*, but the press reports speak of a mail train as being stopped by the strikers, who have spiked switches.

The Chicago, Milwaukee & St. Paul, through its Industrial Commissioner, Mr. Luis Jackson, issued a few weeks ago, a pamphlet describing the road, and the country which it traverses, in four languages, English, German, Scandinavian and French, for the benefit of European newspaper reporters visiting the World's Fair; and during the first four months of the Fair there were, according to a note in the pamphlet, 163 of these reporters who took trips over the road.

The Wells-Fargo Express Company has renewed its contract with the Southern Pacific road for 21 years from Jan. 21, 1894. The express company is to give the railroad company \$1,750,000 of new stock, thereby increasing the express company's capital stock to \$8,000,000, and pays the railroad company for transportation at rates fixed in the contract. The first contract between the Southern Pacific and Wells, Fargo & Co. was in 1866 for 15 years, the express company paying \$1,600,000 of its stock as a bonus. The second contract was for 12 years, from Jan. 1, 1881, to Jan. 1, 1893, \$1,250,000 of the express company's stock being turned over.

The fashion of button badges seems to be spreading. Not long ago some one in Ohio got up a scheme for providing employees of the Pennsylvania lines with buttons embellished with the figure of a keystone, to be made in different colors for different branches of the service. This idea, however, was not looked upon with favor by the officers of the road, and we believe it failed; but now we learn from a Philadelphia paper that a similar scheme for the Lehigh Valley has been brought out by one of the officers of that road, and that the train and station men will soon appear with enameled button badges bordered with gold, showing the well-known red flag trademark of that road.

A lawsuit against the Chicago & Northwestern Railway which dates back to 1871 is now on trial in Chicago. Wright Brothers, the plaintiffs, owned a large livery stable on Kinzie street opposite the freight offices of the road, and both stable and offices were burned during the great fire. The plaintiffs charge that at the time of the fire the defendant had in the freight offices a greater amount of oil than allowed by the city ordinances, and that the explosion of this oil at the time the offices burned threw flames over the livery stable, thus causing it to burn. On the other hand it is charged that the stable was the first to burn. The case has been tried three times, having gone to the Appellate Court, and been reversed. The plaintiffs seek to recover damages to the amount of \$150,000.

At the annual meeting of the New York, New Haven & Hartford last week there was inquiry about the restriction of the stockholders' time-honored privilege of a free ride to their annual meeting. President Clark explained that it might be necessary to cut off this privilege, as, owing to the extension of the lines of the road, it would be liable to abuse. It appears that heretofore stockholders have been allowed to ride wherever they pleased on the day of the annual meeting, and as often went to New York as to the meeting. When it comes to giving the owner of one share, who resides at the tip end of Cape Cod, a free ride to New York to do her shopping, the injustice to other stockholders, who stay at home, may well be taken account of, and President Clark does well to call a halt.

Newspaper reporters who have occasion now and then to criticise railroad managers for disregarding their obligation to give early and full information to the public will note with pleasure the prompt manner in which General Manager Chappell, of the Chicago & Alton, replied to the published charge that a train of his road refused to heed signals of distress raised by a passenger train of the Wabash which was wrecked close to the Alton line near Nameoki, Ill., last week. The explanation is very courteous, full and explicit. The substance of it is that the notice to the Wabash train was given by a porter, at a station, some distance back, and help was not asked for, neither was it stated that persons had been injured. It is admitted that the conductor may have erred in judgment in not offering help, but there appears to have been nothing said to convey to him an adequate idea of the seriousness of the disaster. The Alton engineer says that as he passed by the wrecked train he saw no signs of distress.

President Roberts and other officials of the Pennsylvania company were in Zanesville, O., last Friday inspecting the Kimbolton Tunnel, of the Cleveland & Marietta, two miles from Zanesville. This tunnel is closed and all trains are run around by way of the Panhandle and Baltimore & Ohio. The tunnel took fire about two months ago, and after all the timbering had been burned out, a coal seam in the hill took fire. Both ends of the tunnel were closed up in an effort to smother out the fire, but after two weeks, when they were opened, the fire was found to be still burning. An effort is now being made to clear out the débris, so that the fire may be reached and quenched with water. The tunnel is full of suffocating smoke, but the workmen are making some headway, and hope to get to the point where the fire is located within a few weeks. The work is progressing night and day in short shifts, the men being unable to work more than a few minutes at a time.

Sulphuric Acid Thermometer.

According to the *Revue Industrielle*, sulphuric acid thermometers are gradually coming into more extended use, having the advantage of being able to indicate both higher and lower degrees of temperature than either alcohol or mercury thermometers. Mercury freezes at 40 deg. C. and sulphuric acid at 112 deg. C. Alcohol, on the other hand, disengages vapor at comparatively low heat which is not the case with the acid, the expansion of the latter, moreover, being absolutely proportional to the increase of temperature.

The Siberian Railroad.

With the completion of the Siberian Railroad the Russian railroad system will take first rank, in point of length, among the several European systems. The length of the main line of the Siberian road will be about 4,000 miles, with intervening water carriages on different rivers and on Lake Baikal of about 1,500 miles. These gaps will eventually be closed up. According to the Austrian *Eisenbahn-Zeitung*, the road, as at present under construction, calls for 610,000 tons of rails, while the estimated rolling stock will comprise 2,000 locomotives, 3,000 passenger cars and 36,000 freight and other cars. The estimated cost of the road is placed at about \$175,000,000, and the line is to be ready for operation along the whole length, making use of the waterways already referred to, by the year 1902.

Lake Notes.

The paucity of lake freights is ascribed by the *Marine Review* to a reduction of about 33 per cent. in the shipments of iron ore from Lake Superior mines. There is a loss of almost 21 per cent. on the ore reaching market through the "Soo" Canal and a much larger loss in shipments from Escanaba. The total shipment from the Lake Superior region is not expected to exceed 6,000,000 tons. On the other hand shipments through the canal up to Oct. 1 show a decided increase in grain and lumber. The traffic passing through the canal for two years is tabulated below:

ST. MARY'S FALLS CANAL TRAFFIC.

	To Oct. 1893.	To Oct. 1892.	Per cent. inc. or dec.
All freight, net tons.....	8,097,471	8,824,168	8 2 dec.
Coal, net tons.....	2,296,142	2,335,912	1.7 dec.
Iron ore, net tons.....	3,188,187	4,077,424	20.8 dec.
Flour, barrels.....	4,738,3 0	3,810,222	19.8 inc.
C. m., bushels.....	1,889,594	1,370,982	27.5 inc.
Wheat, bushels.....	30,735,481	28,476,245	6.7 inc.
Lumber, M. feet.....	409,712	388,147	5.2 inc.

It will be noticed that while there is a decrease of 8.2 per cent. in the total freight traffic, the coal and iron ore freightage is this year but 6.7 per cent. of the total, while last year it was 72.1 per cent.

The late storm on the lakes is said to have been the most destructive to life and property that has occurred since October, 1880. Reports to hand show a loss of 85 lives, and 13 vessels. Some 30 more are beached or waterlogged; of these many will be a total loss. The money value of the vessels lost is estimated at \$500,000. Among the vessels lost is the *Dean R. Chapman*, 1,74 tons net register, which, when it was launched in 1864, was considered one of the finest and stanchest vessels on the lakes.

The British Coal Trust.

In 1865 W. S. Jevons attracted great attention by his prediction that at the rate of increase in British coal consumption, which had obtained from the commencement of the century until 1860, it would be necessary in rather more than a century to go to the depth of 4,000 ft. for coal if the present rate of increase was continued. This prediction was based on an increase of 3½ per cent. per annum. Professor Jevons' prediction and the actual consumption are shown below:

Jevons' estimate.	Actual consumption.
1861.....	83,500,000
1871.....	117,000,000
1881.....	166,200,000
1891.....	185,500,000

But notwithstanding the fact that the consumption falls 26.5 per cent. below the prediction of Jevons, the amount is large, and Sir George Elliott proposed a gigantic trust to handle the entire output, which should be capitalized at £110,000,000, one-third debentures and two-thirds stock, and should also prevent future strikes. The debentures were to pay five per cent., and the stock a minimum of 10 per cent. The prospectus sets forth: "In view of the exceptional nature of the property concerned, it is believed that the dividend upon the stock need never be less than 10 per cent., but the profits shall not exceed five per cent. more without the approval of the Board of Trade, and such five per cent., if paid, shall be divided equally between the lessee and the workman. In the event of the Board of Trade sanctioning an advance in price sufficient to yield any interest beyond 15 per cent., the whole further profit will then be divided equally in thirds between the workmen, the coal lessees and the purchaser."

Large economies in pumping, superintendence and sale are promised and these economies seem to be generally admitted. But with the "Salt Union" and the "Aikali Union" prominent, there is a generally expressed fear that prices will be advanced. So it is asserted that the proposed union is impracticable of formation and that it lacks inherent strength. As the last British coal trust was formed in 1771 and lasted until 1845, we may look for a good deal of interest in a good thing, and the last number of the *Iron Trade Circular* says that the replies to Sir George's circular show a balance of seven to one in favor of the trust, and concludes that the scheme will go through.

Spanish-American Notes.

All of the passenger cars on the São Paulo branch of the Central Railroad, Brazil, have been equipped with Westinghouse air-brakes.

The National Railroad Board of Argentine has reported favorably on the following tenders for rolling stock for the Andine Railroad: J. B. Medic, for 25 platform cars; Evans, Livock & Co., for 82 freight cars; and Ramon Lemos, for 1 locomotive, 10 baggage cars, 1 cattle car and 51 *lonas* or tarpaulins.

The Argentine railroads having encouraged the cultivation of alfalfa by making special rates; there are now less than 3,000,000 acres planted to this forage plant in Argentine. The shipments of alfalfa in 1892 amounted to 39,200 tons, averaging a value of \$15 per ton.

The petroleum wells at Cacheuta, in the province of Mendoza, Argentina, are proving so productive that a pipe line has been laid to San Vicente, at which place large storage tanks have been erected. The oil is chiefly used at present by the Mendoza gas works, and by the

Argentine Great Western Railroad, which line has 12 locomotives constructed to burn petroleum.

The receipts of the *Autofagasta & Bolivia Railroad* for August, 1893, were \$454,000, as against \$235,643 in August, 1892.

The report of the Central Uruguay Railway Co. of Montevideo for the year ending June 30, 1893, shows a gross income of £256,002, against £244,569 for the previous year, the expenses being £137,441 and £133,580 respectively. The working expenses were therefore 53.80 per cent. for 1892-93, as against 54.62 per cent. for 1891-92. The number of miles in operation is 271.

The gross receipts of the *Mogiana Railroad*, state of São Paulo, Brazil, for 1892 amounted to 7,408,000 mil reis (mil reis at par = 54 cents), and the expenditures were 5,747,000 mil reis. The length of the line is 579 miles. The company paid a dividend for the year of 8 per cent.

The gross income of the *Buenos Ayres Great Southern Railroad* for the first six months of the current year amounted to \$5,000,000, being an increase of \$500,000 over the receipts for the first half of 1892.

The gross income of the *Central Argentine Railroad* for the half-year ending June 30, 1893, was \$1,674,000, against \$1,290,000 for the corresponding period of 1892, while the operating expenses for the two periods were 55.56 per cent. and 65.25 per cent. respectively.

The *Central Uruguay Eastern Extension Railroad* reports, for the year ending June 30, 1893, net receipts of £26,383, against £14,702 for the preceding year. The number of miles in operation is 128, as against 123 in 1892.

The *Central Uruguay Northern Extension Railroad*, with 182 miles of track in 1893 and 138 miles in 1892, announces a net revenue of £10,663 for 1892-93, against £8,999 in 1891-92.

The progress of Argentina, in spite of bad financing and rumors of war, is shown to be very considerable from the following table of a few products:

	1893.	1893.
Wheat.....	410,000 tons	1,500,000 tons
Corn.....	220,000 "	900,000 "
Linseed.....	30,000 "	60,000 "
Sugar.....	25,000 "	45,000 "
Grapes.....	80,000 "	100,000 "
Wool.....	130,000 "	140,000 "
Meat.....	300,000 "	360,000 "
Tallow.....	30,000 "	40,000 "

The total value of the products of Argentina so far for the year 1893 amounts to \$222,000,000.

A concession has been granted by the government of Chili to Mr. Charles E. Lister for the organization of a national syndicate for the manufacture of iron and steel in that republic.

The municipality of Iquique, Chili, has been authorized to issue bonds to the amount of \$500,000, bearing interest at eight per cent., to raise funds for putting in a system of drainage.

The Chilean Congress has granted a concession for a second trans-Andine railroad, to connect the Southern Railroad of Chili with the Argentine Great Western at La Paz, a distance of 250 miles. It is proposed to use the Tinguiricra Pass across the Andes, 50 miles north of the Planchon, over which the Crawford survey was made in 1872, and 60 miles south of the Portillo Pass, over which Darwin made his well-known journey. The distance from Buenos Ayres to Curicó, Chili, by this route would be 840 miles. The concession carries with it no subsidy.

The Colombian government is making a rigid investigation of the circumstances under which the contract was let to an English syndicate for the construction of the Antioquia Railroad. The enormous sum of \$80,000 per mile, which the syndicate was to receive for building this road, naturally aroused suspicion. It is now stated that the government has ascertained that various officials of Antioquia have received bribe money, and that no less than £100,000 has been distributed in this manner.

A telegraph line is to be established without delay between the city of San Jose, Costa Rica, and Panama. This is an important move in linking Central American interests to those of South America. Hitherto the connection has been feeble, although there has been some traffic between Venezuela and Colombia on the south and the Central American states on the north. This telegraph line will facilitate such trade and also tend to develop the intervening territory.

The 1900 World's Fair.

The proposed universal exposition to be held at Paris in the year 1900 is already much talked of in the French journals, and the choice of a site for the building and some of the principal details of the undertaking are attracting attention. The French Minister of Commerce, in a recent report addressed to the President of the Republic, urges the early organization of a board of management and the taking in hand of some of the preliminary work.

A Good Notion for the Street Railroads.

The Calumet Electric Street Railroad, that operates 54 miles of track in the southern part of Chicago, and which connects about a dozen of the suburbs of the city, has placed in each of its cars a map, about 14 x 17 in., which shows plainly how to get to various points on the line. The map is a blueprint, the routes are shown in heavy white lines, and only the streets through which the tracks run are given; the names of these streets and of each suburb reached are given, the letters being large and readily distinguished from each other. The map has been of much assistance to those visitors to the World's Fair who have had to patronize the road, and residents in those parts that are served by the company have appreciated this comparatively small indication on the part of the company of due respect for its patrons.

The Trolley in Chicago.

The Chicago City Railway Company has introduced two ordinances in the City Council asking permission to use the overhead trolley system on all its horse car lines. This does not refer only to the cross-town car lines in the outlying parts of the city, but also to wires in the heart of the business center. An extremely strong opposition will be brought up against the use of this system in the crowded parts of the city, but it may be allowed on lines further out. Two of their cross-town lines, the Forty-seventh street and the Sixty-first street, have been operated all summer by electric power with very satisfactory results.

Electric Railroad for Carrying Coal.

The electric railroad between Buck Mountain and Eckley, Pa., near Hazleton, is now completed, and will be put into operation during the coming week. The road has been built to haul the coal from the Buck Mountain stripings to the breaker at Eckley.

LOCOMOTIVE BUILDING.

The Baldwin Locomotive Works have received an order for ten Vauclain compound locomotives for the Philadelphia, Reading & New England road. Of these, seven are consolidation freight locomotives with high pressure cylinders 13½ x 24 in., low pressure cylinders 23 x 24 in., and driving wheels 50 in. diameter. They will weigh in working order about 125,000 lbs. The other three are passenger locomotives with high pressure cylinders 12 x 24 in., low pressure cylinders 20 x 24 in., and driving wheels 68 in. diameter; estimated weight in working order about 96,000 lbs.

CAR BUILDING.

The Pennsylvania company has ordered 250 box cars built at its shops in Fort Wayne, Ind., and will soon increase the number of working hours.

Murray, McDougal & Co., of Milton, Pa., have commenced work upon 550 coal cars, 300 for the Baltimore & Ohio, and 250 for the Wilkes-Barre & Eastern.

The car works of Arthur King, at Middletown, Pa., are still engaged on a large order from the Burton Stock Car Co., which will take some time yet to complete.

The Buffalo Car Co. is building 200 60,000-lb. cars for the Buffalo & Susquehanna road. The cars will be equipped with the Westinghouse air-brake and M. C. B. couplers.

E. R. Bacon, President of the Baltimore & Ohio Southwestern, has just received from the Pullman Works the "Virginia," a handsome combination car 75 ft. 5 in. long, finished in vermilion and satinwood, trimmed with embroidered leather.

On of the finest cars ever built is the private car "Alexander" built by the Pullman Car Company for Mr. A. A. McLeod, President of the New York & New England. It is also one of the strongest and heaviest. The sills, of themselves, make a solid flooring, being placed close together and tongued, and on top of these is a double flooring 1½ in. thick laid diagonally with a layer of deadening material between the two thicknesses. The sides are also solid, except at the windows, and are thicker than usual; the usual spaces between framing are filled by vertical pieces similar to the posts. There are three thicknesses of sheathing inside, the middle one extending vertically and the other two lengthwise of the car, and two thicknesses outside. The interior is finished in different colored woods; the dining-room, in the middle of the car, is in mahogany, handsomely carved; one bedroom is in maple; the lavatory in this room is of Mexican onyx; another room is finished in light blue; and the observation end is of a darker finish. The car is provided with storage batteries which supply the current for the incandescent lamps by means of which the car is lighted.

The Pullman company has just delivered to the Seaboard Air Line 12 cars for passenger-train service; four are passenger coaches, four are combination smoking and baggage cars, and four are combination express and mail cars. The cars conform to the Pullman standards, having what is now termed the "old" vestibule, or the narrow one. They are painted Pullman standard color, are 60 ft. long over sills, and have six-wheel trucks. The interior finish is in oak, natural color, with no carving. The cars are equipped with Westinghouse air-brake, Janney drawhooks, Janney-Buhou platforms, National hollow brakebeams, Baker heaters, and Paige wheels 38 in. in diameter. The cars are for the fast Atlanta lines.

The same company has completed an order for 20 passenger cars for the Boston & Maine and the Maine Central. The cars are all of the same design and finish, as they are intended to run in through trains over the two roads. They have the "new" vestibule, or the one that extends the full width of the platform. These cars make a very handsome train.

BRIDGE BUILDING.

Conneautville, Pa.—The Canton Wrought Iron Bridge Co. has about completed the two new county bridges over the Cussewago at Ladner's Mill and Jolly's, a couple of miles south of this place. They are 93 and 100 ft. spans respectively.

Howard County, Md.—The contract for building an iron bridge, costing \$2,245, over the Little Patuxent River near Savage has been awarded by the county commissioners to the Penn. Iron Bridge Co.

Indiana, Pa.—A new county bridge will be erected over the Little Mahoning at Rochester's Mills. The contract for the stonework has been let.

Johnstown, Pa.—The Massillon Bridge Co., of Massillon, O., has the contract for the erection of the new county bridge across Chest Creek at Patton. It will be of iron and cost something over \$1,400.

New York City.—A bill for the charter of the New York & New Jersey Bridge Co., having been favorably reported to the House from the Committee on Commerce, was passed by the House on Oct. 18, amendments being made providing for a certain progress to be maintained in the erection of the bridge and the completion of the work in a limited time, the charter to become null otherwise.

Scranton, Pa.—An ordinance has been presented to council permitting the West Ridge Coal Co. to replace the present bridge at Green Ridge Street by a higher and longer structure. The mayor has signed the ordinance awarding the contract for the Parker street bridge to the Penn Bridge Co.

Sharon, Pa.—The commissioners have invited proposals for the construction of a new iron bridge across the Shenango at this point to replace the one which collapsed recently. The structure is to be 180 ft. long. Bids will close Nov. 4.

Toledo, O.—Eight bids for the construction of the Western avenue bridge were received and the contract awarded to the Toledo Bridge Co. The bids on superstructure and substructure work combined were: Toledo Bridge Co., \$6,064; Massillon Bridge Co., \$6,112; Ohio Bridge Co., \$6,785; Iron Substructure Co., \$6,876; King Bridge Co., \$7,221; Variety Iron Works, \$8,380; Columbus Bridge Co., \$8,527. The bridge is to be 100 ft. long, with an 18 ft. roadway and two sidewalks each 5 ft. wide.

Western New York & Pennsylvania.—It is understood that new iron bridges will soon be built by this company at Scottsville, Cuyerville, Rossburg and Cuba. With the exception of a few small bridges all on the

Rochester Division will be of iron or steel. The new Portage bridge is now in use.

Williamsport, Pa.—The County Commissioners have given the Groton Bridge Co. of New York, a contract to erect a bridge across Lycoming Creek, near Ralston. It is to be 100 ft. long and cost \$4,000.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Baltimore & Ohio, semi-annual, 2½ per cent., payable Nov. 15.

Great Northern, quarterly, 1¼ per cent. on the preferred stock, payable Nov. 1.

Pullman Palace Car Co., quarterly, \$2 per share, payable Nov. 15.

St. Paul, Minneapolis & Manitoba, quarterly, 1½ per cent., payable Nov. 1.

Wheeling & Lake Erie, quarterly, 1 per cent. on the preferred stock, payable Nov. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alabama & Vicksburg, annual, Jackson, Miss., Nov. 6.

Baltimore & Ohio, annual, Baltimore, Md., Nov. 20.

Buffalo, Rochester & Pittsburgh, annual, New York City Nov. 20.

Grand River Valley, annual, Jackson, Mich., Jan. 10, 1891.

Louisville & Nashville, special, Louisville, Ky., Nov. 8, to vote on an increase of the stock to \$60,000,000.

Manhattan Elevated, annual, New York City, Nov. 8.

New Orleans & Northeastern, annual, New Orleans, La., Nov. 1.

New York, Lake Erie & Western, annual, New York City, Nov. 28.

New York & Northern, annual, New York City, Nov. 8.

Nyack & Northern, annual, New York City, Nov. 2.

Philadelphia, Germantown & Norristown, annual, Philadelphia, Pa., Nov. 6.

Spokane Falls & Northern, annual, Spokane, Wash., Nov. 13.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Western Railway Club meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 7:30 p. m.

The Northwest Railroad Club meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, except June, July and August, at 8 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

The Canadian Society of Civil Engineers meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday.

The Technical Society of the Pacific Coast meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The Tacoma Society of Civil Engineers meets at its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

The Association of Engineers of Virginia holds informal meetings the third Wednesday of each month, from September to May, inclusive, at 719 Terry Building, Roanoke, at 8 p. m.

The Boston Society of Civil Engineers meets at Wesleyan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The Western Society of Engineers meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

The Engineers' Club of St. Louis meets in the Odd Fellows' Building, corner Ninth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia meets at the House of the Club, 112 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The Engineers' Society of Western Pennsylvania meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The Civil Engineers' Club of Cleveland meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The Engineers' Club of Cincinnati meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 8 p. m.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the South meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The Engineers' Club of Minneapolis meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of St. Louis.

The Club met at the clubrooms on Oct. 18, President Moore in the chair, and 23 members and 1 visitor present. Messrs. A. M. Lockett, A. W. Dickens, A. Schnadelbach and C. G. Reel were elected to membership. The Executive Committee were instructed to give up the present rooms of the Club and make arrangements, if possible, to meet at Washington University.

The paper of the evening on "Landslides and Their Prevention," as illustrated in some noted examples on the German government railroads, by D. A. Molter, was read by Prof. Johnson.

The paper discussed the various causes of landslides in cuts and on embankments, in different kinds of soils, and gave the details of many noted cases, and the methods used to stop them, all illustrated with full plates. It also presented a new theory of equilibrium of

earth slopes and pressures against retaining walls Discussion followed by Messrs. Dean, Crosby, Judson and Ferguson.

Canadian Society of Civil Engineers.

At the first meeting of the Canadian Society of Civil Engineers for this season, held in the Society's rooms, Mansfield street, Montreal, the Nominating Committee sent in the following report: President, P. A. Peterson; Vice-Presidents, H. Wallis, Alan Macdougall, P. W. St. George; Treasurer, K. W. Blackwell. Alan Macdougall, of Toronto, read an interesting paper on domestic sanitation.

Engineers' Club of Cincinnati.

At the September meeting Col. Latham Anderson read a paper under the title "Telford versus Macadam—Which Was Right?" which discussed the question of the best method of constructing broken stone roadways. The essential features of a roadway of this kind, he said, were: An unyielding foundation, through surface and under drainage, hard, tough stone for wearing surface, proper size of stone, and the thorough compacting of the materials. The paper discussed two of these requirements, the foundation and the covering, as contained in the practice of Telford and Macadam.

Engineering Association of the South.

At the regular meeting of the Association in Nashville, Tenn., Oct. 12, Prof. W. W. Carson, of Knoxville, Tenn., presented a paper entitled "A Plea for a More Rational Presentation of the Calculus." The beginner in the calculus finds the continuity of mathematical science broken, and, instead of meeting the characteristic clearness of proof, is surrounded by perplexity and darkness. The author investigates the cause of this state of affairs and proposes a remedy. The demonstrations of the calculus of to day rest on limits, or on infinitesimals, or on both. The former proves the formulas without giving any foundation or any explanation of the nature of the calculus; the latter explains, but does not prove, yet, as it leads directly to true merits it is accepted. Proofs by limits, when sifted down, rest on slippery definitions and ambiguous language; infinitesimals are invested with the property of changing their magnitude from the considerable to the inconsiderable, as occasion may demand. The author repudiates the doctrine of infinite quantities, both infinitely great and infinitely small; such a classification is artificial and useless. Instead the author would introduce hypothetical quantities. A real occurrence takes place by a continuous change of conditions, and in a real magnitude the conditions are different for the different parts; the hypothetical quantity is what we suppose would exist under a reduced number of the conditions actually obtaining in the real quantity, hence is simpler than the real. The calculus is defined as "that branch of mathematics which connects real and hypothetical quantities." The problem of the differential calculus is—given the real quantity, to find the hypothetical; that of the integral calculus is—given the hypothetical to find the real. The investigator desires to find a certain real magnitude, which, on account of the complexity of the conditions, is beyond the reach of his other mathematics. He turns to the hypothetical, and considers a magnitude similar in nature to the real and that would exist under conditions less complex. If this simpler magnitude is within the reach of his mathematics, the real is reached by the rules of integration, otherwise the process of the hypothetical is repeated until the conditions are sufficiently simple; then, by a series of integrations, the real is reached. With this conception of hypothetical quantities are logically derived those formulas gotten by the limit calculus, and what its "derivatives" are shown; multiplying these equations through by dx gives the equations used in the infinitesimal calculus.

The Association will next convene at the annual meeting, Nashville, Nov. 9.

PERSONAL.

—Mr. C. E. Walker has been appointed Superintendent of Motive Power of the Toledo, St. Louis & Kansas City road, in place of W. I. Cooke, resigned.

—Mr. E. T. H. Gibson, Assistant Treasurer of the Illinois Central, was elected Treasurer of the company at the annual meeting on Oct. 18, succeeding the late Mr. Henry De Wolf.

—Mr. J. W. Petheram has been appointed Chief Engineer in Charge of Bridges, Buildings and Roadways of the Missouri, Kansas & Texas, of Texas, with headquarters in Denison, Tex.

—Major E. S. Hosford, Division Superintendent of the Mobile & Ohio, but lately with the freight department of the Illinois Central, died suddenly at Jacksonville, Ill., last week from a stroke of paralysis.

—Mr. James Mills, for a long series of years Eastern General Freight Agent of the Boston & Albany, with office at Boston, but for the last two years an invalid, died at his home near Boston, last week.

—Mr. A. A. Allen has been appointed General Manager of the Missouri, Kansas & Texas for its Texas lines, but he will still remain in his present position as General Superintendent of the entire system.

—Mr. C. L. Thomas, Assistant General Freight Agent of the Chicago & Erie, with headquarters at Chicago, has been appointed General Freight Agent. The office of Assistant General Freight Agent has been abolished.

—Mr. Robert Harris, who was President of the Northern Pacific Railroad from 1884 to 1889, was elected a director and Vice-President of the company at the annual meeting in New York last week. Mr. Harris was also for a time Chairman of the Board of Directors, being Mr. Henry Villard's predecessor in that office.

—Mr. W. D. Irwin, Roadmaster on the New York Central & Hudson River road at Schenectady, N. Y., while assisting in clearing a freight wreck west of the city on Oct. 24, was caught under a falling car and injured so that he lived only three hours. Mr. Irwin was about 33 years of age and leaves a wife and one child.

—Mr. George T. Wilbur, mention of whose critical illness was made last week, has since died at his home in Honesdale, Pa. Deceased was born in Genesee, N. Y., April 23, 1822, and for some years was Superintendent of the works of the Delaware & Hudson at Honesdale and of the gravity road as far as Waymart. He was retired on a pension in the fall of 1885.

—Mr. Brayton Ives, who has been elected President of the Northern Pacific road, is a former director. He was a member of the stockholders' investigating com-

mittee, which submitted a report early in the year criticising various acts of the management, and since that time he has been one of the most active of those in opposition to the old management. He is President of the Western National Bank of New York and a director of a number of corporations.

—Mr. E. H. McHenry, who has been appointed Chief Engineer of the Northern Pacific to succeed Mr. J. W. Kendrick, now General Manager of the road, has been Principal Assistant Engineer at Tacoma since 1891. He was previously engineer on one of the Eastern divisions. He has had direct charge of construction work on a number of branch lines, whose construction has involved some very heavy work, and he has planned and carried out many important improvements on the western end of the main line.

—Mr. T. S. Abbott, who has had a considerable experience in engineering work in Mexico, has opened an office as consulting engineer at Saltillo, Mex., and is prepared to examine and make reports for investors upon Mexican railroads, waterworks, mines or other engineering projects in that country. Mr. Abbott has resided in Mexico since 1881. He was connected with the Mexican National on construction work from that year until 1888, rising to the post of Chief Engineer of Construction. Since 1891 he has been engaged on the construction of the Mexican Southern Railroad as engineer in charge of the Mountain division, and has only recently completed that work.

—Mr. J. T. Odell has resigned as General Manager of the Baltimore & Ohio Railroad Company, to take effect Nov. 1. Mr. Odell has been with the Baltimore & Ohio as General Manager over four years. He came to its service from the Chesapeake & Ohio, of which he was General Manager. He had previously been with the Northern Pacific as Assistant General Manager. Mr. Odell has done much toward the development of the Baltimore & Ohio properties in late years. Ill health is given as the reason for his resignation. He has accepted the position of assistant to President Mayer, of the Baltimore & Ohio, with headquarters at Chicago. This office was created for and first filled by the late Emmons Blaine, who died in Chicago in June, 1892.

ELECTIONS AND APPOINTMENTS.

Albany & Susquehanna.—At the annual meeting held in Albany, N. Y., Oct. 17 the following directors were elected: R. M. Olyphant, New York City; Horace G. Young, Albany; Minard Harder, Cobleskill, N. Y.; James Roosevelt, Hyde Park, N. Y.; George I. Wilbur, Oneonta, N. Y.; Alfred Van Santvoord, Benjamin H. Bristol, Robert Olyphant, William H. Tillinghast, Charles A. Walker, New York City; Robert C. Pruyne, James H. Manning, W. S. M. Phelps, Albany.

Atlantic & Pacific.—W. E. Walsh has been appointed Auditor, with headquarters at Albuquerque, N. M., vice W. W. Pope, resigned because of ill health. H. A. Culloden has been appointed Assistant Auditor, to succeed W. E. Walsh.

Bangor & Aroostook.—The company held its annual meeting in Bangor, Me., last week. The following officers were elected: President, A. A. Burleigh; Vice-President, C. F. Bragg; Directors: A. A. Burleigh, C. F. Bragg, J. P. Bass, Edward Stetson, C. A. Gibson, B. B. Thatcher, Edward L. Stewart, of Bangor; Henry C. Sharp, Monticello; Jere F. Hacker, of Fort Fairfield, and T. H. Phair, of Presque Isle; Treasurer, Edward Stetson; Clerk, F. H. Appleton.

Carrollville, Tallahassee & Georgia.—J. A. McDuffie has succeeded A. Orr Symington as General Manager. Mr. McDuffie was formerly with the Brunswick & Western and Erie roads. Mr. Symington will take charge of the company's business at Carrollville, Fla., the gulf terminus of the new road.

Denver & Rio Grande.—The annual meeting of the company was held in Denver, Col., Oct. 17, and the following directors elected: George Coppell, Richard T. Wilson, William Mertens, H. M. Baldwin, Charles C. Beaman, of New York; John L. Welch, Edwin Smith, of Philadelphia; E. T. Jeffery, E. O. Wolcott, of Denver.

Duluth, South Shore & Atlantic.—On Nov. 1 the headquarters of the freight department will be removed from Marquette, Mich., to Duluth, Minn.

Evansville & Terre Haute.—The following directors were elected at the annual meeting held in Evansville, Ind., Oct. 16: D. J. Mackey, E. Huston, F. W. Cash, of Evansville; W. H. Tifford, F. Roosevelt, John L. Lamson, Harvey E. Fisk, William Curtis and T. H. Wheeler, of New York.

Fairmount, Morgantown & Pittsburgh.—The first annual meeting of this company, which is controlled by the Baltimore & Ohio road, was held in Pittsburgh, Pa., Oct. 17, and the following directors elected: J. V. Patton and David W. Van Eman, Pittsburgh; John W. Mason, Fairmont, W. Va.; William A. Hanway and William Reed, Baltimore; A. Fairchild, Morgantown; Robert Wardrop, Pittsburgh; Henry C. Huston, Connellsburg; and William Hunt, Uniontown. Vice-President Thomas M. King, of the Baltimore & Ohio, was elected President.

Fitchburg.—W. D. Ewing having been appointed General Superintendent of this road in place of John Adams resigned, the office of Assistant General Superintendent will be abolished on Nov. 1.

Great Northern.—At the annual meeting, held at St. Paul, Minn., on Oct. 16, the following directors were re-elected to serve for three years: James J. Hill, Samuel Hill and W. P. Clough.

Illinois Central.—At the annual meeting of the stockholders of the company, held at Chicago, on Oct. 19 the stockholders elected John Jacob Astor as a director to take the place of Arthur Leary, deceased, and re-elected B. F. Ayer, Walther Lutgen and John W. Auchincloss. Stuyvesant Fish was re-elected President; J. C. Welling, Vice-President; J. T. Harahan, Second Vice-President; B. F. Ayer, General Counsel; James Fentress, General Solicitor; A. G. Hackstaff, Secretary; E. T. H. Gibson, Assistant Treasurer, was elected Treasurer to succeed Henry De Wolf, deceased.

Lake Shore, Riverview & Elgin.—The first board of directors of this Illinois company are: D. W. Wood, G. M. Sterne, T. H. Coleman, C. F. Wood and Thomas Jones. The officers are as follows: D. W. Wood, President; Isadore Price, Secretary; Thomas H. Coleman, Treasurer; Thomas Jones, Right of Way Agent.

La Porte, Houston & Northern.—At the regular annual meeting of the stockholders of the railroad held

Oct. 10 the following directors were elected: A. M. York, J. R. Holmes, J. H. York, T. W. Lee, J. H. Tenant, W. B. Lowrance and A. O. Blackwell. At the directors' meeting following A. M. York was elected President; J. R. Holmes, Vice-President; J. H. York, General Manager; A. O. Blackwell, General Counsel, and C. G. Woodbridge, Chief Engineer. The chief office of the company is at La Porte, Tex.

Louisville, Evansville & St. Louis.—The annual meeting of the stockholders was held at Belleville, Ill., Oct. 19; 32,901 shares of stock, more than 80 per cent. of the whole, was represented. The following directors were elected: D. J. Mackey, E. C. Hopkins, F. W. Cooke, G. P. Heilmann and W. J. Lewis, of Evansville, Ind.; C. C. Baldwin, T. Barrett, of New York; Arnold Kummer, of Baltimore, and Bluford Wilson, of Springfield, Ill.

Missouri, Kansas & Texas (of Texas).—A. A. Allen has been appointed General Manager of this company, with offices at Denison, Tex., and will assume general control and management of the operation of the road.

Montgomery, Memphis & St. Louis.—The following have been elected directors of this company, which succeeds the Montgomery, Tuscaloosa & Memphis road: C. C. Monroe, of New York; E. B. Joseph, W. E. Joseph, A. S. Woolfolk and George B. Shellhorn, of Montgomery, Ala.; W. T. Northington, of Prattville; G. A. Searcy, W. C. Jamison and F. S. Moody, of Tuscaloosa, Ala. The directors elected the following officers of the new company: President, C. C. Monroe, of New York; Vice-President, E. B. Joseph, of Montgomery; Secretary and Treasurer, George B. Shellhorn, of Montgomery.

New York, New Haven & Hartford.—At the stockholders' meeting in New Haven on Oct. 18 the following directors were elected: E. H. Trowbridge, C. P. Clark and G. J. Brush, of New Haven; William D. Bishop, Nathaniel Wheeler, Bridgeport; Henry C. Robinson, Hartford; Joseph Park, Channey M. Depew, William Rockefeller, J. Pierpont Morgan, George MacCulloch Miller, New York; John M. Hall, Willimantic; Charles F. Choate, Nathaniel Thayer, Boston; Royal C. Taft, Rhode Island; Charles F. Brooker, Torrington, Conn.; Carlos French, Seymour; Leverett Brainard, Hartford, and Henry S. Lee, Springfield. President Clark said that at the time negotiations for the lease of the Old Colony were in progress it had been agreed that four names would be added to the Board of Directors of this road to represent the Old Colony interest. He stated also that the number which had constituted the Board for many years had been thirteen, seven of whom, according to the charter provisions, were residents of Connecticut. The charter provides that more than half shall live in this state. The names that were to be proposed were Charles F. Choate, Frederick L. Ames and Nathaniel Thayer, of Boston, and Royal C. Taft, of Rhode Island, but because of Mr. Ames' death but three would be presented from out of the state. President Clark then said that in order to maintain a majority of the directors in Connecticut three more would have to be added, and that their names were Charles F. Brooker, Carlos French and Prof. George J. Brush, of Yale. Beside these the name of ex-Judge John M. Hall, of Willimantic, the company's new vice-president, was also added to the list of directors.

The directors met at New Haven on Oct. 23 for the election of officers. The balloting resulted as follows: President, Charles P. Clark, of New Haven; First Vice-President, John M. Hall, of Willimantic; Secretary, William D. Bishop, Jr., of Bridgeport, and Treasurer, W. L. Squire, of New Haven.

Norfolk & Carolina.—The annual meeting was held in Norfolk, Va., Oct. 20, and the old Board of Directors was re-elected. The officers elected were: President, W. G. Elliott; Vice-President, H. Walters, Wilmington, N. C.; Secretary and Treasurer, C. G. Elliott, Norfolk, Va.

Northern Pacific.—The annual meeting of the stockholders in New York on Oct. 19 resulted in the election of the directors nominated by what was known as the Belmont-Ives Committee, which was opposed to the former management. The number of shares voted was 583,924, all for the directors elected, no other names being proposed. The names of the new directors are as follows: Isaac W. Anderson, August Belmont, Charles T. Barney, William L. Bull, J. Horace Harding, Robert Harris, Marcellus Hartley, Brayton Ives, Johnston Livingston, Donald Mackay, August Rutten, Wilbur F. Sanders and Winthrop Smith. Of the 13 members of the old board, W. L. Bull and Charles T. Barney were the only ones retained. The names of the retiring directors are: Charles B. Wright of Philadelphia; Thomas F. Oakes, Roswell G. Rolston, Charles L. Colby James B. Haggard, Colgate Hoyt and George A. Morrison, of New York; James B. Williams, of Stamford, Conn., and David S. Wegg, of Chicago. Henry Villard, of New York, and Edwin H. Abbot, of Cambridge, Mass., resigned some time ago. The new Board of Directors elected the following officers: President, Brayton Ives; First Vice-President, Robert Harris; Second Vice-President, C. H. Prescott, of Tacoma, Wash.; Secretary, George H. Earl; Treasurer, George S. Baxter; General Attorney, Silas W. Pettit; General Auditor, J. A. Barker. Mr. Earl and Mr. Baxter and Mr. Barker retain their present positions. The following appointments have been announced: John E. Turner to be District Passenger and Land Agent with office at 42 Jackson Place, Indianapolis, vice D. W. Janowitz, resigned; W. H. Whitaker, formerly District Passenger and Land Agent at St. Paul, transferred to Detroit, to succeed A. A. Jack, resigned; Charles E. Johnson to be District Passenger and Land Agent at St. Paul, to succeed W. H. Whitaker, transferred.

E. H. McHenry, Principal Assistant Engineer, has been appointed Chief Engineer, to succeed J. W. Kendrick, who has been elevated to the position of General Manager. The headquarters of the Chief Engineer have been removed from Chicago to St. Paul.

Ohio Southern.—President and General Manager G. W. Saul has abolished the office of superintendent, recently filled by John Ramsey, and appointed H. T. Dick Assistant to the General Manager. Trainmaster Crosbie has been promoted to Master of Transportation.

Pittsburgh Junction.—At the annual meeting held in Pittsburgh, Pa., Oct. 17, the following directors were elected: John W. Chalfant, C. B. Herron, H. W. Oliver, Allegheny City, Pa.; Jacob Painter, Jr., Reuben Miller, William Metcalf, John G. Speer, A. Bradley, A. E. W. Painter, C. L. Fitzhugh, Pittsburgh, Pa.; Charles F. Mayer, William F. Frick, Baltimore, Md. Thomas M. King, Vice-President of the Baltimore & Ohio, was elected President.

Powell's Mountain Mineral.—The charter of this

company, recently filed in Tennessee, gives the list of names of incorporators: L. M. Garvis, H. F. Coleman, A. J. Tyler, D. F. Bailey, Joshua Davis, W. T. Wolfe, W. B. Davis, C. H. Coleman, Sampson Williams, T. J. Harrison and Burton J. Drennon.

Pullman's Palace Car Company.—The annual meeting of this company was held in Chicago on Oct. 20. The retiring directors were re-elected as follows: George M. Pullman, Marshall Field, J. W. Doane, Norman Williams, O. S. A. Sprague, of Chicago; Henry C. Hubert, of New York, and Henry R. Reed, of Boston.

Quincy, Omaha & Kansas City.—John Patton and Edwin Parsons, trustees of the road, have resigned, and Theodore Gilman, of New York City, and W. W. Jacobs, of Hartford, Conn., have been elected to succeed them.

Rio Grande Junction.—The annual meeting was held in Denver, Col., Oct. 8, and the following directors were elected: Edward T. Jeffery, Joel Vaille, H. Colbran, Joseph W. Gilluly, Edward R. Murphy, Charles E. Gast and Henry T. Rogers. The last two directors were elected to succeed C. E. Noble and L. M. Cuthbert.

Rio Grande Southern.—The following officers were elected at a meeting of the stockholders held in Denver, Col., Oct. 17: Otto Mears, President, Denver, Col.; S. M. Green, Vice-President; Alexander Andrew, Secretary; J. L. McLean, Treasurer.

San Antonio & Aransas Pass.—The annual meeting was held in San Antonio, Tex., Oct. 11, and the following directors elected: M. D. Monserrate, T. E. Stillman, W. Berry, R. H. Innes, Thomas B. Palfrey, F. H. Davis, Reagan Houston, J. W. Terry and W. H. Mahl. The officers elected were: T. E. Stillman, of New York City, President; M. D. Monserrate, Vice-President; Reagan Houston, Secretary, and W. H. Mahl, Treasurer, San Antonio, Tex.

South Bound.—The property of this road was recently turned over to the Florida Central & Peninsular, and the following directors were elected to represent that company: W. Bayard Cutting, R. Fulton Cutting, John K. Gapen, New York; B. A. Denmark, Savannah, and A. C. Haskell, Columbia, S. C. The officers elected were: President, H. R. Duval, 32 Nassau street, New York City; Vice-President, J. E. Tucker, Savannah, Ga.

Tennessee & Eastern.—The incorporators of this company are as follows: J. L. Cannable, Chas. G. Sherman, E. M. Cannable, A. W. Gaines and William M. Allen, all of Chattanooga, Tenn.

Western Maryland.—The annual meeting was held in Baltimore, Md., Oct. 18, and the following directors were elected: B. A. Betts, Chewsville, Md.; W. Keahofner, Hagerstown, Md.; Edward Worthington, Glyndon, Md., and Robert Biggs and John M. Littig, of Baltimore.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Abbeville Southern.—The contractor is making every effort to complete this road and have it ready for traffic to Abbeville, Ala., by Nov. 15. He has already graded and laid the track about 20 miles north of the junction with the Alabama Midland, which is made at Dothen, Ala. A considerable portion of the work on the last seven miles has also been finished, and the bridges are now being built, so that if the weather is favorable the work will be completed at the time expected. S. G. Pruitt, of Montgomery, is the contractor. The construction work has been under the charge of Bradford Dunham, General Superintendent of the Alabama Midland.

Baltimore & Ohio.—A short branch is to be built to Normalville, Pa., from a point on the line near the mouth of Indian Creek, for which Drake & Stratton, of Pittsburgh and New York, have the contract. The firm is now prepared to let the sub-contracts for the grading, Booth & Flynn, of Pittsburgh, and other contractors have been over the work.

Bangor & Aroostook.—At the annual meeting in Bangor, Me., last week it was reported that excellent progress is being made on the construction of the line. Tracklaying has reached the East Branch, over 45 miles of rails being laid, and the entire grading will be completed this week. It is confidently expected that trains will be run through to Houlton by Nov. 20, and that freight will be taken and received there by Dec. 1, while passengers will be carried before the end of the month.

A committee representing the town of Patten, Me., were present in regard to a branch line of the road to Patten. They stated that the citizens would agree to raise money to furnish the right of way, grade the line, etc., if the company would lay the rails and operate the branch. President Burleigh and Vice-President Bragg were appointed a committee to consult with the citizens.

Buffalo & Susquehanna.—The track on this railroad has now been completed to Galeton, Pa., which is to be the terminus of the line. Construction trains are now running through to that town from Keating Summit, on the Western New York & Pennsylvania, but it is not proposed to have regular through passenger trains running for at least a month. The road belongs to the system being built in Potter County and other northern counties of Pennsylvania by Messrs. F. H. & C. W. Goodyear, of Austin, Pa., and the lines are building chiefly to open up the timber property belonging to that firm. About 60 miles of road have been built under various charters, and it is probable that the various lines will shortly be consolidated under the above name.

Burlington & Missouri River.—The right of way purchases through the Crow Indian Reservation, which extends along part of the southern State line of Montana, are reported to have been finally completed last week. The right of way is for the extension of the line building through Wyoming, and which has now reached a point near the Montana State line. A great deal of work, bridging, grading and changing the channel of the Little Big Horn must be done this winter, before high water and freshets make it impossible, and it is thought that such work will be begun shortly. The promptness with which the right of way business has been settled seems to confirm this view.

Carrabelle, Tallahassee & Georgia.—Tracklaying is progressing on the railroad under the supervision of General Manager A. Orr Symington and Chief Engineer F. P. Damon. Only 30 miles remains to be laid south of Tallahassee to complete the line to Carrabelle, Fla. Very little of the grading remains to be done, and the bridges and trestles are also nearly all erected. The

entire line to Carrabelle, on the Gulf Coast, will probably be ready for operation in December.

Condon Lane Boom & Lumber Co.—This company is building a standard gauge line from Hendricks, W. Va., to the headwaters of the Grandy River, in Randolph County, passing through Marlinton and also Roncavete, on the Chesapeake & Ohio. The road is being built in connection with the West Virginia Central & Pittsburgh. Work is now progressing on the line at a point about 35 miles from Beverly and about an equal distance from Marlinton. The company is employing its own hands and has about 300 of them at work. The road is building to open up timber land, but it will be opened to general traffic.

Excelsior Springs.—The first train over this road was run last week from Excelsior Springs, Mo., south to the connection with the Wabash near Missouri City, a small town on the Missouri River in Clay County, Mo. The line is ten miles long, and will be operated as a branch of the Wabash Railroad.

Fairmount, Morgantown & Pittsburgh.—The road will be opened for traffic as far as the Cheat River, beyond Point Marion, Pa., probably by Nov. 12. Work is being pushed on the line, but the bridge over the Cheat River is not completed. Through trains from Fairmount and Morgantown to Smithfield, Pa., will likely commence running about the first of the year. The length of the road from the junction with the main line of the Baltimore & Ohio near Fairmount, W. Va., north to Uniontown, Pa., is 57 miles. The road between Fairmount and Morgantown, W. Va., and between Uniontown to Smithfield, Pa., has been in operation some years. The new construction work has consisted in building 21 miles to complete the gap.

Florence, Cripple Creek & State Line.—The direction in which this line is to be built from Florence, Colo., is in a general northwesterly course to the Cripple Creek mines, and not as given in a recent issue. The line will be about 50 miles in length through some rough country. The heaviest grade is four per cent. There is considerable blasting to be done and a great deal of culvert work. It is the desire of the company to have the line in operation by May 1. The weather will not interfere with the heavy work, that of blasting.

Georges Valley.—The track on this road is all laid between Warren and Union, Me., eight miles in length. Ballasting is progressing rapidly, two-thirds of it being already completed. Side tracks are also completed except Y's at each end, which are now being built. The track at South Union is completed and those at Union will be ready for use on Oct. 28. Mr. James Mitchell, the contractor, announces that the road will be opened the first week of November.

Jacksonville, St. Augustine & Indian River.—On the extension building from Rockledge, Fla., south to West Palm Beach, Fla., the track has been laid as far as the Sebastian River, about 40 miles, and the tracklaying is progressing as fast as possible. Much of the grading between the Sebastian and the Jupiter rivers is completed. Between Jupiter River and West Palm Beach the grading is nearly finished and track is being laid, and it is expected to have trains running on this portion of the line by Dec. 1. About 1,500 men are now at work on the line. Charles O. Haines is Chief Engineer, with present headquarters at Melbourne, Fla.

Lake Shore, Riverview & Elgin.—The incorporation of this company in Illinois last week has been announced. The road proposed is to extend from a point on Lake Michigan between Rogers Park and Evanston to Riverview, on the Wisconsin Central, thence to Elgin, Ill. The incorporators are: D. W. Wood, of Park Ridge; George M. Sterne, of Englewood; Thomas H. Coleman, of Rogers Park; C. F. Wood, of Akron, O.; B. M. Baker, of Chicago. The officers are given in another column.

Newport & Sherman's Valley.—At a meeting held in Dry Run, Franklin County, Oct. 10, some \$2,000 was subscribed toward the extension of the line that far. This with what had been pledged before runs the subscriptions up to nearly \$14,000. The prospects for the early completion of the extension are considered very fair.

Norfolk & Western.—The rails of the Dingess Branch of this road, on the Ohio River extension, in West Virginia, have been laid and completed as far as the Pearl mines, and the first shipment of coal from that plant was made last Friday. The road is to be continued several miles farther to reach other mines and timber camps.

Pittsburgh, Beltzhoover & Knoxville.—This road was chartered in Pennsylvania last week. The line is to start in the city of Pittsburgh, running through the borough of Beltzhoover to a point in the borough of Knoxville, all in Allegheny County, Pa. President, James M. Bailey, Allegheny, Pa.; Directors, Wm. H. Nimick, Jas. H. McRoberts, Robert A. Carter, Alex. M. Nepper, Pittsburgh, Pa. Capital, \$15,000.

Roaring Creek.—Work on this line is progressing rapidly. James F. Potts is the contractor. He has a force of men at work on the bridge over the Tygart River below Harding Station, on the West Virginia Central & Pittsburgh road. Three of the piers for the bridge are completed, and the superstructure will be ready as soon as the shore abutments are completed. The road is being built 10 miles down the Roaring Creek region from the West Virginia Central, and it will open up a coal region 100 miles square. The work of grading is well under way, but it will be pushed more rapidly when the bridge mentioned above is completed and construction material can be transferred to the other side of the river.

Susquehanna.—The proposed route of this road, as given in the charter filed in Pennsylvania recently, is from the borough of Plymouth through the township of Hanover, to the city of Wilkes Barre, all in Luzerne County, Pa. John C. Haddock, of Glen Summit, Pa., is President, and the Directors are Geo. W. Shonk, Plymouth, Pa.; John C. Haddock, Glen Summit, Pa., and Elmer H. Lawall, Wilkes Barre, Pa.

Sioux City, Chicago & Baltimore.—The officers of this company which proposed to build a line from Sioux City to Hannibal, Mo., have abandoned the project and released the tax, amounting to \$480,000, voted by Sioux City to aid the enterprise.

St. Croix & Duluth.—Tracklaying and grading on the railroad near Grantsburg, Wis., is completed for this year and traffic will begin in a few days. The road is being built by the Empire Lumber Co., of Red Wing, and will give an outlet to some fine standing pine.

Toledo & Ohio Central.—The officers of this road are preparing to open the new Western Division (from Columbus to Toledo, by way of Ridgeway) on Nov. 9. Until the terminals at Columbus are completed trains will enter the Union Station over the tracks of the Columbus & Cincinnati Midland and the Cleveland, Cincinnati, Chicago & St. Louis. The United States Express Company has the contract for carrying express matter, and it begins its service between Marysville and Toledo Nov. 1.

Wheeling Bridge & Terminal.—Work on the Benwood extension of this line, which was temporarily discontinued on account of the appointment of a receiver, was commenced again last week, and will be pushed rapidly to completion. The work now under way is the building of heavy trestle, about two miles in length, which will carry the line from the lower part of Wheeling, W. Va., almost to Benwood, where it will come to solid foundation again upon entering the lands of the Riverside Iron Co. It is not likely that the work can be completed before spring.

Wheeling & Elm Grove.—This road has built a connecting line from its main line in Fulton, two miles from Wheeling, W. Va., to the tracks of the Baltimore & Ohio and the Wheeling Bridge & Terminal road, and is now receiving and dispatching freight by that route.

GENERAL RAILROAD NEWS.

Annapolis & Baltimore Short Line.—Judge Morris, in the United States Circuit Court in Baltimore, has directed the Safe Deposit & Trust Co., trustee, to sell this road, which is now in the hands of a receiver. The order was the result of an application by Joseph S. Ricker and other bondholders representing \$410,000 of the \$500,000 first mortgage bonds. The road has a second mortgage indebtedness of \$500,000 and a capital stock of \$500,000. Charles A. Coombs, General Manager, was appointed Receiver for the road on March 8 last.

Baltimore & Ohio.—The statement of earnings and expenses of the entire system for the month of September shows: Earnings, \$2,268,154; operating expenses, \$1,382,707; a net decrease of \$80,618 compared with September, 1892. For the three months ended Sept. 30 the total earnings were \$6,607,222, and the expenses \$4,194,371, a net increase of \$90,279 over the same months of 1892.

Baltimore & Ohio Southwestern.—At the meetings of the stockholders of the Ohio & Mississippi and Baltimore & Ohio Southwestern Railroad companies, at Cincinnati, Oct. 21, the agreement of consolidation was fully ratified and approved by unanimous vote. At the meeting of the Ohio & Mississippi stockholders \$21,600,000 were represented out of a total of \$24,000,000; and that at the Baltimore & Ohio Southwestern meeting \$4,500,000 were represented out of a total of \$5,000,000. The consolidation will take effect Nov. 1. This is a full ratification of the plan of consolidation that was agreed upon with the English shareholders in February last.

Charleston, Cincinnati & Chicago.—The lines of this company in South and in North Carolina, as well as in Tennessee, have been formally transferred to the Bondholders' Committee. The reorganizers will incorporate companies in South and North Carolina, Tennessee, Virginia and Kentucky. The consolidated company will probably be known as the Ohio River & Charleston Railroad. A gap of about 80 miles exists between the Tennessee and North Carolina sections. It would be very expensive to build the connection, as the route is through a very mountainous country. Samuel Hunt, of Cincinnati, is now in charge of the road for the bondholders.

Cleveland, Canton & Southern.—Some of the Eastern bondholders have decided to make application to the courts for the appointment of a third receiver for the railroad, in the interest of the first mortgage bondholders. S. V. White, who negotiated the sale of \$1,500,000 of these bonds, is prominent in the movement for a third receiver, and it is intimated that he may be appointed. The Receivers have offered a somewhat novel proposal to the security holder, requiring the assent of the holders of a number of liens. The plan is to apply to the Court for authority to issue \$1,100,000 in Receivers' certificates, most of which will be used to pay about \$900,000 floating debt and thus save about twice that amount of collateral. The holders of liens below the first mortgage bonds are asked to consent to having the certificates made a lien next to the first mortgage.

Cleveland & Marietta.—Press despatches have this week announced that the Pennsylvania has secured control of the above railroad, which, if true, gives it a continuous route from Marietta on the Ohio River, to Toledo, or Lake Erie. Besides this, it gives to the Pennsylvania Railroad an outlet for the large coal deposits in the Canbridge coal fields. The Cleveland & Marietta Railroad is 110 miles long, and has been used principally as a coal and freight road.

Columbus, Hocking Valley & Toledo.—The General Term of the New York Supreme Court has reversed the judgment in favor of the defendants in the suit brought by Congressman James J. Belden against ex-Judge Stevenson Burke, Wallace C. Andrews and others, in regard to the consolidated bonds of this company. In 1881 ex-Judge Stevenson Burke and associates consolidated three coal roads into this system. A consolidated mortgage for \$8,000,000 was issued, and it is alleged that the mortgage represented that the proceeds were to be used for double track and other improvements. It is asserted that the funds were really used to pay for the stock of the minor roads, which was owned by the officers and directors of the consolidated road. Judge Burke secured a verdict in his favor in Special Term, which is now reversed.

Denver & Rio Grande.—The present Board of Directors was re-elected at the annual meeting in Denver on Oct. 17. Chairman George Coppell addressed the stockholders, saying in part: In January last the unfunded floating indebtedness of the company was discharged, and the preferred stock was placed on what the directors considered a safe dividend-paying basis, with reasonable hope of a continuance of the payments. But after payment of two quarterly dividends in February and May last the action of the East India Council in closing its mints to coinage of silver had such an adverse effect upon the mining industries of this state, and consequently upon the earnings of your railroad, as to cause the directors to suspend further payments of dividends for the time being and until the future of the company became more settled. There are now signs of a better business outlook in Colorado; and the interests

of the state and this railroad company are so closely allied that prosperity to the one cannot be but beneficial to the other, or the reverse. The coal traffic of the company is being fairly well maintained, and is a source of steady revenue, as neighboring states and territories are dependent on Colorado for a supply of fuel. The new line to the anthracite coalfields, authorized to be built in September last year, is now in operation, and a large supply of that coal will soon be available.

Detroit, Bay City & Alpena.—Judge Swan, of the United States Court of Detroit, by consent of all parties concerned, has appointed Don M. Dickinson Receiver of the railroad. The application for a receiver was made on Sept. 11 by the Farmers' Loan & Trust Company of New York, the Trust company asking that M. L. Scudder of Chicago receive the appointment, the opposing interest that Gen. Russell A. Alger, President of the road, be continued in charge of the property as Receiver.

Gouverneur & Oswegatchie.—A certificate of the lease of this railroad to the New York Central & Hudson River Railroad Company has been filed in the office of the Secretary of State, at Albany, N. Y. The leased road runs from the village of Gouverneur east to the village of Edwards, in St. Lawrence County, 14 miles, and was built in 1893 as a branch of the Rome, Watertown & Ogdensburg.

Kentucky & Indiana Bridge Co.—The United States Circuit Court at Louisville last week appointed a Receiver for this property, the company having defaulted in the payment of interest to its first mortgage bonds amounting to a million dollars, and the second mortgage bonds amounting to nearly \$800,000. The control of the stock is held in Louisville, and all the directors are residents of that city or of New Albany, Ind. The company owns the Kentucky & Indiana bridge over the Ohio River at Louisville and operates about 10 miles of railroad track.

Lancaster & Reading.—This road, known as the Quarryville branch, has been operated by the Philadelphia & Reading, through a lease to the Reading & Columbia, one of its controlled lines. The road is 18 miles long, from Lancaster to Quarryville, Pa. The Receivers of the Reading have permitted a default in the interest payments on the seven per cent. bonds. A committee of the bondholders was appointed to demand the surrender of the property and operate it until a sale of foreclosure could be arranged. Last week, however, the committee submitted a proposition to the Philadelphia & Reading Receivers that the defaulted seven per cent. interest be paid up to July 1, then six per cent., up to the present time, when the bonds will be extended and the lease continued at five per cent.

The President of the Lancaster, Oxford & Southern, a partly-built road, has made an informal proposition to guarantee five per cent. interest on the bonds. About 30 miles of road will have to be built to make connection between Quarryville and Oxford, Pa., at which points the two roads terminate. The Lancaster & Oxford connects with the Baltimore & Ohio at Singery, and the Quarryville road connects with the Reading at Lancaster.

Middlesborough Belt.—J. H. Bartlett, of Middlesborough, Ky., has been appointed Receiver of this railroad upon petition of the bondholders. He is also a Co-Receiver of the American Association, Limited, of London, which for several years past has been engaged in the attempt to build a manufacturing town at Middlesborough, Ky. The belt railroad was projected to reach all the mines, furnaces and coke ovens in the vicinity of the town of Middlesborough, and the company built about 13 miles of main line and five miles of branches. The road is operated by the Knoxville, Cumberland Gap & Louisville.

Middle Georgia & Atlantic.—This company is now operating the Eatonton branch of the Central of Georgia, Receiver Comer, of that company, having surrendered the branch road to the stockholders. The present arrangement for the operation of the branch is only temporary, but it is likely to be continued under some form of contract. The branch is 20 miles long from Millidgeville to Eatonton, and gives its company a line 50 miles long from Millidgeville to Covington, Ga.

New York, Pennsylvania & Ohio.—Judges Lurton and Ricks, in the United States Court at Cleveland, O., have decided against the motion to appoint a separate receiver for this railroad holding that the present Receivers of the New York, Lake Erie & Western could operate the road on the lease or turn it over to the owners, as they chose.

Northern Pacific.—The annual meeting in New York City on Oct. 19 resulted in the election of a new board of directors, only two of the former directors, Charles T. Barney and W. L. Bull, of New York, representing foreign security holders, being re-elected. Both were nominated by what was called the Belmont committee, which had secured proxies for over 580,000 shares of stock. The annual report has not been printed, but the results for the year were reported at the meeting. The year ends on June 30, and the earnings were:

	1893.	1892.	Ine. or Dec.
Gross earn.....	\$29,531,302	\$30,205,421	D. \$54,119
Oper. expen.....	18,793,339	18,265,551	I. 527,788
Net earn.....	\$10,757,963	\$11,939,870	D. \$1,181,07
Other income.....	2,166,726	1,664,204	I. 502,522
Total.....	\$12,924,689	\$13,604,074	D. \$679,385
Fixed charges.....	13,813,945	12,769,187	I. 1,014,758
Deficit.....	\$889,256	\$834,887	I. \$1,724,143
Two per cent. div.....	731,862		
Surplus.....	\$103,025		

The other income includes \$526,875 dividend on St. Paul & Northern Pacific stock; \$704,251 land sales.

Operating expenses on Northern Pacific and branches were 60% per cent., against 57.48 per cent. in 1892.

TONNAGE STATISTICS.

	1893.	1892.	Ine. or Dec.
Tons.....	4,165,712	3,936,976	I. 228,738
Rte's per ton.....	1.30c.	1.40c.	D. .17c.
Passengers.....	2,687,135	2,724,830	D. 37,985
Rate.....	2.60c.	2.70c.	D. .67c.

Henry Stanton, of New York, and F. G. Winston, of Minneapolis, have been appointed Receivers for the Little Falls & Dakota, Fergus Falls & Black Hills, and Duluth & Winnipeg branches.

An application was made before Judge Dubuc at Winnipeg, Man., on Oct. 16, at the instance of the Farmers' Loan & Trust Company, of New York, for the appointment of receivers for the Northern Pacific & Manitoba. Receivers appointed were George A. Simpson, of Winnipeg, and Henry Stanton, of New York.

Pullman's Palace Car Co.—The statement of operations for the year ending July 31 shows the following results:

Revenue.	\$9,200,685
From earnings of cars.....	\$9,200,685
From patents.....	30,021
From manufacturing, rentals, dividends, interest, etc.....	2,159,190
	\$11,389,896
Disbursements.	\$3,825,940
Operating expenses.....	\$3,825,940
Proportion of net earnings paid other interests in Sleeping Car Associations controlled and operated.....	1,037,508
Dividends on capital stock.....	2,520,300
	7,383,448
Surplus for the year.....	\$4,006,448

During the year a new contract has been made with the Boston & Maine for 25 years. The contract with the following companies expiring at various periods have each been extended 25 years: Lehigh Valley, Maine Central and the Norfolk & Western. There have been built during the year 314 sleeping, parlor, dining and special cars, and seven parlor cars have been purchased, the entire cost being \$4,782,123. The number of cars owned and controlled is 2,573, of which 2,320 are standard and 233 tourist or second-class cars. The number of passengers carried during the year was 5,673,129, and the number of miles run was 266,453,750. During the previous year the number of passengers carried was 5,279,020, and the number of miles run was 191,255,636. The total mileage of railroads covered by contracts for the operation of cars of this company is 126,975. The value of the manufactured product of the car works of the company for the year was \$12,329,827, and of other industries, including rental, \$1,044,881, making a total of \$13,414,708, against \$11,726,343 for the previous year. The average number of names on the pay-rolls at Pullman for the year was 5,533, and wages paid \$3,413,786,56, making an average for each person employed of \$613, against \$590.05 for the previous year.

The total number of persons in the employ of the company in its manufacturing and operating departments is 14,035, and wages paid during the year \$1,751,644.32. The number of employees for the previous year was 12,800, and wages paid \$6,619,156.03.

Tamaqua, Hazleton & Northern.—The report that the operation of this road had been discontinued by the Philadelphia & Reading is erroneous to a certain extent. The company has withdrawn most of its train service on the road because Cox Brothers & Co. no longer ship their coal over the line, having diverted their traffic to the Lehigh Valley and Pennsylvania railroads, but the branch has not been entirely abandoned.

Toledo, Ann Arbor & North Michigan.—The Central Trust Co., of New York, filed a bill of complaint on Oct. 19 in the United States Circuit Court at Toledo, asking for the foreclosure of a mortgage for \$2,120,000, which is a first mortgage on a part of the road, and also praying that a new receiver be appointed and the present officers of the company be restrained from disposing of any of the property.

Toledo, St. Louis & Kansas City.—The Michigan Car Company, of Detroit, has filed a petition in the United States Circuit Court against the Toledo, St. Louis & Kansas City Railroad to compel the Receiver to pay 36 cents of \$1,217 each and one note of \$1,791, a total of \$45,617, on account of rental for cars.

TRAFFIC.

Traffic Notes.

The Southwestern Traffic Association will next week make another attempt to elect a chairman.

Since the beginning of 1893 the Davis Coal & Coke Co. has shipped 11 large steamer loads of coke from Baltimore to Mexico and the West Indies.

Rumors come from Baltimore of the formation of a traffic association, independent of the Southern Railway and Steamship Association, "which shall better protect the interests of Baltimore."

The Kansas Railroad Commissioners have decided the complaint of Wichita people concerning the freight on agricultural implements from the Missouri River to Wichita, ordering the rate reduced from 32½ cents to 25½ per 100 lbs. This rate is ordered to be put in effect from all towns on the Eastern boundary of Kansas and also on similar shipments from Wichita to points to which the distance is not greater than from the river to Wichita.

General Transportation Agent Charles P. Hatch, of the Philadelphia Trades League, has just issued his annual report telling what his department has done during the past year. It is stated that all complaints regarding discrimination in rates, against Philadelphia as compared with other cities, have ceased. The time required to send freight from Philadelphia to Central Pennsylvania, to New York State, to New England and to the South has been greatly reduced.

On Oct. 18 (preceding Manhattan Day at the World's Fair) all the lines out of New York ran day-car excursion trains to Chicago, the fare being \$15 for the round trip by all lines. Some of the roads also ran the regular half-fare excursions, the tickets for which were less closely limited. The day-car excursion over the Erie carried over 2,500 passengers from Salamanca to Chicago.

The Executive Committee of the California Traffic Association, the organization of San Francisco merchants of which J. S. Leeds is Traffic Manager, has issued an address to the members, recounting the work of the Association for the past year. Credit is taken for starting the severe competition which resulted in the present low rates between California and Atlantic ports, both by rail and water, and "careful estimates based upon the earnings of the transcontinental lines for the last year show that those lines are losing at least \$500,000 a month." The old and the new rates on dried fruit, canned goods, wine, wool, barley and other prominent commodities are quoted, showing the great reductions that have been effected. It is stated that action looking to the construction of new railroads to interior points in California has been postponed only because the money market is now so unfavorable. In connection with this report we note a recent item in a Philadelphia paper to the effect that a sailing vessel now loading there for California is the first instance of the kind for many months. The steamers which go around Cape Horn are so much faster than the sailing vessels and take freight at such low rates that the sailors cannot make a living out of the traffic. The ship now loading will get \$6.50 per ton on most of its cargo.

Chicago Traffic Matters.

CHICAGO, Oct. 25, 1893.

Notwithstanding the apparently peremptory instructions of the Trunk lines that all lake and rail rates should be advanced on Sept. 18 to the agreed basis, these rates have been steadily reduced until on Oct. 23 the lake and rail lines were quoting rates on the basis of 20 cents per 100 lbs on 5th class and 15 cents on 6th class, Chicago to New York. As these two classes include flour and grain, the situation is just as bad as it was before the action of the Trunk lines. As was stated in my dispatch last week the Chesapeake & Ohio has agreed to prorate with the Northwestern lines on any cuts made by lake and rail or all rail to New York, and to day the Northwestern lines began quoting through rates on flour, millstuffs, grain and oil cake from Minneapolis and St. Paul to Newport News via Chicago at 27 cents per 100 lbs. In addition to this the Northwestern lines have openly attacked the central traffic lines by making a deal with the lake lines and quoting reduced rates on flour, etc., from St. Paul and Minneapolis to Boston 27 cents per 100 lbs, New York 25, Philadelphia 23 and Baltimore 22. For the central traffic lines to get any of this business before the close of navigation they must reduce their interior rates.

There is some question as to the probable attitude of the Receivers of the Union Pacific toward the Western Passenger Association. The representative of the company had agreed to cancel its notice of withdrawal the day the Receivers were appointed, but in consequence of their appointment announced that the withdrawal would have to stand and the matter of future membership be left for the decision of the Receivers. Should they conclude that a membership is not necessary the Atchison will probably withdraw, in which event the stability of the Association will be seriously threatened.

The Wisconsin Central announces that connection will be made with the Northern Pacific at St. Paul as heretofore, but that the severance of through car service will necessitate transfers at that point.

Western lines have refused to accept as basing rates the reduced rates quoted by the Soo Line (Canadian Pacific) from St. Paul to Portland (Or.) and San Francisco. Great Northern and Northern Pacific officials were in consultation last week considering the advisability of meeting the rates, but the result of this conference is not yet made public. The rate as now quoted is \$50 to Portland and \$65 to San Francisco, round trip. The old rate was \$80.

The Central traffic lines have voted to accept half fare round trip tickets to Chicago on all cars on all trains; also that these tickets—the World's Fair day-car excursion tickets—may be sold up to and including Oct. 30, with a final return limit of ten days.

The Western roads have voted to place the immigrant traffic in the hands of a commissioner at New York, but the Union Pacific declines to give its assent unless all other trans-continental lines agree. It is a notorious fact that notwithstanding repeated promises to discontinue the payment of excessive commissions on this business several of the lines have continued paying as high as \$10, thus allowing a liberal margin to the agent for securing the business.

Rates to California until Nov. 15 will be made by adding World's Fair rates to the \$65 50 round trip rate from the Missouri River.

The shipments of eastbound freight, not including livestock, from Chicago, by all the lines for the week ending Oct. 21 amounted to 63,234 tons, against 54,073 tons during the preceding week, an increase of 9,161 tons, and against 61,616 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	Wk to Oct. 21.		Wk to Oct. 14.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	7,075	11.2	4,889	9.1
Wabash	4,293	6.8	3,629	6.7
Lake Shore & Michigan South.....	10,733	17.0	7,165	20.6
Pitts., Ft. Wayne & Chicago.....	8,066	12.8	6,577	12.2
Pitts., Cin., Chicago & St. Louis.....	8,205	13.0	6,178	11.4
Baltimore & Ohio	3,911	6.3	3,161	5.9
Chicago & Grand Trunk.....	3,143	5.0	2,711	5.0
New York, Chic. & St. Louis.....	6,021	9.3	6,116	11.4
Chicago & Erie.....	9,129	14.5	6,39	12.4
C., C., C. & St. Louis.....	2,606	4.1	2,572	5.3
Totals.....	61,234	100.0	54,073	100.0

Of the above shipments 2,333 tons were flour, 27,300 tons grain and millstuffs, 10,350 tons cured meats, 12,167 tons dressed beef, 1,097 tons butter, 2,168 tons hides and 3,670 tons lumber. The three Vanderbilt lines carried 37.5 per cent., the two Pennsylvania lines 25.8 per cent. The Lake lines carried 114,166 tons, against 110,101 tons during the preceding week, a decrease of 25,953 tons.

(Other Chicago traffic news will be found on page 783.)

Demurrage on Cotton in Texas.

The Texas Car Service Association has extended its jurisdiction so as to cover cotton, both carloads and smaller lots, and Manager Peck has issued a circular prescribing rules as follows:

Cotton (as well as the product thereof), as far as relates to handling, storage or demurrage, will be brought under Car Service rules Oct. 16.

At Hous., Galveston and Velasco, cotton for export will be allowed five days free time from 7 a. m. following the arrival of the car, and thereafter a storage charge for the use of car and tracks will be made of \$1 per car per day; and in case two or more consignments are contained in one car, said \$1 per day will be pro rated per bale, so that the aggregate amount equals \$1 per day.

On cotton seed product for export at Houston, Galveston and Velasco, 10 days free time . . . will be allowed.

At Houston, Galveston and Velasco, compressed cotton (not for export) will be handled under the following rules, viz.:

First.—Four cents per bale shall be charged consignees or owners for ranging, turning down and heading up cotton for the purpose of sampling and marking. A like amount additional will be charged each time this service is performed.

Second.—It is understood that the receipt given to the railroad company when the cotton is turned down and ranged shall be binding upon the owner or owners and shall establish delivery.

Third.—The cotton will be stored by the railway company at expense of owner or consignee (except for the expense of tarpaulins and skids, when such are necessary) three working days from 7 a. m. of the day following arrival.

The charge for storage will be one cent per bale per day with a minimum of five cents per bale for the next seven days. After the expiration of the 10 days here provided, 25 cents per bale for each succeeding 20 days.

At compresses three working days will be allowed for unloading, and at all points cotton seed and cotton seed product (except at Houston, Galveston and Velasco for export) will come under the usual forty-eight hour rule.

The Gulf, Colorado & Santa Fe has not agreed to the new rules.